ARMSTRONG LABORATORY

WATER AND WASTEWATER CHARACTERIZATION SURVEY, WILLIAMS AFB AZ

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Brooks Air Force Base, TX 78235-5000

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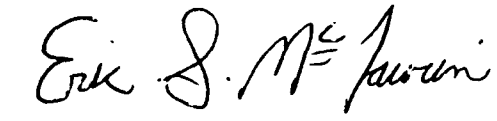

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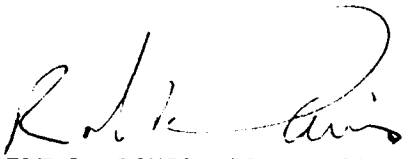

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13. ABSTRACT *(Maximum 200 words)*

The AFOEHL conducted a sanitary/drinking water survey at Williams AFB from 26 Nov 90 to 7 Dec 90. The scope of the survey was to characterize the sanitary system and screen the wastewater treatment plant. Other objectives were to sample the drinking water at Waterdog Recreational Area. Significant findings were: ion-exchange and reverse osmosis units in base housing are not working properly; very large solids concentration in the effluent of the wastewater treatment plant; media (rocks) in the trickling filter may be too large.

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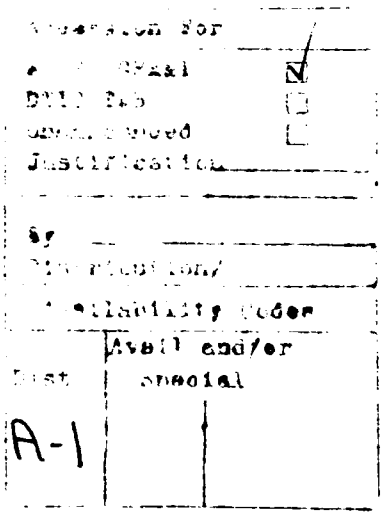

Contents

Illustrations

I. INTRODUCTION

At the request of the Headquarters Air Training Command Bioenvironmental Engineer (HQ ATC/SGPB), the Air Force Occupational and Environmental Health Laboratory (AFOEHL) conducted a wastewater characterization survey at Williams Air Force Base. The scope of the survey included

A. characterizing the influent and effluent of the wastewater treatment plant (WWTP) and the effluent from flight line operations;

B. characterizing effluent at select oil/water and fuel/water separators discharging into sanitary sewers; and

C. characterizing water at base housing, the Waterdog Recreation Facility, and drinking water wells #5 and #8.

The survey was conducted from 26 November to 7 December 1990 by 1Lt Darrin Curtis, 2Lt Eric McLaurin, TSgt Mary Fields, Sgt Robert Davis, and Amn Keanue Simmons. MSgt Ronald Stone, Williams' SGPB NCOIC, provided support for the AFOEHL team.

II. DISCUSSION

A. Introduction

Williams AFB is located approximately 30 miles southeast of Phoenix, Arizona. The base employs approximately 800 civilians and 3500 military personnel. The 82nd Flying Training Wing makes its home at Williams. Tenant organizations include the 425th Tactical Fighter Training Squadron, 1922nd Communications Squadron, Human Resources Laboratory/Operations Training Division, and other organizations.

The base lies in an area known as the "Valley of the Sun." This is a region approximately 100 miles long and 60 miles wide which has been recognized for the amount of yearly sunlight, the sun shines about 80% of the time. Average high temperatures for this region range from over 100 degrees during summer months to the mid 60s during the rest of the year. Average lows range from the 70s during the summer months to the mid 30s during the winter. Average yearly rainfall is approximately 7.5 inches, most of which comes from summer thunderstorms or during winter rains.

B. Background

1. Waterdog Recreation Area: The Waterdog Recreation Area has had difficulty meeting the Safe Drinking Water Act (SDWA) turbidity standard since October 1987. They have been forced to use bottled water, which is very

Note: This report was accomplished by the Air Force Occupational and Environmental Health Laboratory (AFOEHL), which is now the Armstrong Laboratory, Occupational and Environmental Health Directorate.

expensive. The turbidity maximum contaminant level (MCL) is one turbidity unit (TU), but five or fewer TUs may be allowed if the supplier of water can demonstrate to the State that the higher turbidity does not do any of the following:

a. Interfere with disinfection.

b. Prevent maintenance of an effective disinfectant agent throughout the distribution system.

c. Interfere with microbiological determinations.

2. Base housing drinking water: The ground water used for the base water supply is very hard. The base housing units contain an ion-exchange unit followed by a reverse osmosis (RO) unit. The ion-exchange unit, located outside each house, is used to soften the water by replacing calcium and magnesium with sodium using sodium chloride. This unit treats all the water used by the occupants. The RO unit is located inside the house under the sink and only treats the water used for drinking. The main purpose for the RO unit is to remove the sodium chloride.

3. Wastewater system

a. Collection system: The wastewater collection system is used for both domestic and industrial wastes. We collected samples from four points around base including the Auto Hobby Shop, the hospital, the flight line manhole behind building 1085, and the manhole at the corner of D Street and First Street.

b. Oil/water and fuel/water separators: We sampled eight separators during the survey which included Vehicle Maintenance (bldg 533), Aircraft Refueling Vehicle Maintenance (bldg 532), the Auto Hobby Shop (bldg 491), the Aircraft Washrack (bldg 38), the Fuel System Repair Shop (bldg 1092), the Engine Test Cell Shop (bldg 1540), the Wheel and Tire Shop (bldg 1080), and Fuels Management (bldg 550).

c. Wastewater Treatment Plant (WWTP): The base wastewater treatment plant treats sanitary and industrial effluent discharges. Most industrial effluent originates from the flight line operations. The WWTP includes primary sedimentation, trickling filters, final sedimentation, plug-flow chlorine contact basin, and a stabilization pond. Samples were collected at the influent and effluent of the plant. According to WWTP personnel, there has not been a discharge through the permitted outfall in over two years. The water is being used by the golf course for irrigation with the remainder either evaporating or percolating into the soil.

III. RESULTS

Complete site descriptions and sample results may be found in Appendix B. Notable results are discussed below.

A. Waterdog Recreational Area (drinking water): The turbidity was above the one Nephelometric Turbidity Unit (TU) at all three sampling locations. We

also sampled for total trihalomethanes (TTHM), even though it is a non-community water system and is not regulated for THMs. The TTHMs at all three locations averaged well below the 100 ug/L maximum contaminant level (MCL).

B. Drinking Water Wells: Drinking water wells #5 and #8 were sampled for nitrates during the visit and had concentrations of 13 mg/L and 5 mg/L respectively.

C. Drinking Water Housing: The results for the three housing units sampled are shown in Table 1.

Table 1. Drinking Water Results in Housing

BLDG		9063	9579	9670
Test		Ion-exchange unit water effluent		
Alkalinity (bicarbonate)	mg/L	90	90	53
Alkalinity (total)	mg/L	90	90	53
Chlorides	mg/L	410	455	355
Hardness (Calc as CaCO3)	mg/L	5.9	264	493
Calcium	mg/L	1.7	21	143
Magnesium	mg/L	0.4	51	33
Sodium	mg/L	407	81	62
Test		RO unit water effluent		
Alkalinity (bicarbonate)	mg/L	43	35	82
Alkalinity (total)	mg/L	43	35	86
Chlorides	mg/L	275	250	465
Hardness (Calc as CaCO3)	mg/L	184	296	375
Calcium	mg/L	45	84	22
Magnesium	mg/L	17	20	53
Sodium	mg/L	124	50	75

D. Sanitary System

1. Chemical Clean/Flight line Manhole: No significant findings.

2. Human Resource Laboratory (HRL): No significant findings.

3. Auto Hobby Shop: On the second day during the three-day sampling period this site had a significant increase in oil and grease concentration. The results during the three days for oil and grease were 1.6 mg/L, 1190 mg/L, and 40 mg/L.

4. Hospital: No significant findings.

E. Oil/Water Separators

1. Washrack 38: Oils and greases were reported to be 992 mg/L.

2. Auto Hobby: No significant findings.

3. Tire Shop (Building 1080): Oils and greases and total petroleum hydrocarbons were both 640 mg/L. Chromium and copper were reported at 1100 and 2800 ug/L respectively.

4. Vehicle Maintenance Shop (Building 533): No significant findings.

5. Fuel System Repair (Building 1092): The total hydrocarbon and oil and grease were both 8000 mg/L.

6. Aircraft Refueling (Building 532): No significant findings.

7. Engine Test Cell (Building 1540): The oil and grease concentration was 1440 mg/L and the total petroleum hydrocarbon was 160 mg/L.

F. Wastewater Treatment Plant: The data collected on the WWTP is located in Appendix B. The biomonitoring tests are located in Appendix E. The fathead minnow test passed and the Ceriodaphnia dubia failed, but remember that this sample was taken at the effluent to the treatment plant and not the permitted outfall. No significant findings were revealed in the total toxic organics (TTO) test sampled from the effluent. The conclusions section contains additional comments on the wastewater treatment plant.

IV. CONCLUSIONS

A. Waterdog Recreational Area: The filter unit at Waterdog should be able to meet the one TU MCL. The unit installed at Waterdog may have improper media in the filter to match the characteristics of the intake water. Civil engineering should review the specifications and operation of the filter. The turbidity ranged from 1.2 to 2.2 TU with the MCL being one. The lake had been drawn down at the time of sampling and could have had a contributing impact on the initial raw water quality.

The design criteria for the filter system should be evaluated. The design objectives should have been from 0.2-0.3 TU.(3) When evaluating the systems design criteria, current operating procedures should be factored in with this evaluation such as backwashing, headloss before backwashing, loading rate, etc.

Coagulation and flocculation may need to be added prior to the filter. If coagulation and flocculation are inadequate, a high quality filtrate cannot be achieved at any loading rate. With proper media selection and pretreatment, low effluent turbidities can be readily achieved. Loading rates, type of media, media depth, and backwash design are largely determined by the designer's experience with similar applications.(2)

The last resort would be to petition the state for the five-TU limit (40 CFR 141.13a). As part of the petition, the supplier must demonstrate to

the State that the higher turbidity does not do any of the following: interfere with disinfection, prevent maintenance of an effective disinfectant agent throughout the distribution system, or interfere with microbiological determinations. Turbidity has been demonstrated to interfere with disinfection (Symons and Hoff, 1975; Hoff, 1978; Hijkal et al., 1979; Foster et al., 1980; Boyce et al., 1981; Emerson et al., 1982)* because particulates responsible for turbidity can also surround and shield microorganisms from disinfectant action. Organic materials can decrease disinfection efficiency by adhering to cell surfaces and hindering attack by the disinfectant, reacting with the disinfectant to form compounds with weaker germicidal properties, or reacting irreversibly with the disinfectant to produce products with no disinfection capabilities.(3)

B. Drinking Water Wells: Well #8 had a concentration of 13 mg/L of nitrate as nitrogen. This is above the EPA 10 mg/L limit for areas where children have access to the drinking water. Our samples were collected at the well and not after treatment. The SDWA MCL applies after treatment, so the base may realize some reduction of nitrate during filtration. Also, nitrates are only sampled once every three years. The nitrate influence to well #8 could be from years of cotton farming near the well.

If well #5 (5 mg/L) is used to its maximum extent and well #8 is only used when well #5 has been exhausted (current practice), concentration of nitrate in the distribution system should be maintained below the 10-mg/L MCL. Even though well #5 is in close proximity to well #8 the hydrogeology may be different causing subdivided discharge zones and the resulting difference in nitrate levels.

C. Drinking Water in Base Housing: The sample results from the housing area are consistent if the ion-exchange unit and the RO units are working properly. However, if the units are not functioning properly or they are not being maintained properly, the data would vary from what is expected.

For example, in house 9063 the hardness concentrations that have passed through the ion-exchanger are as they should be, a low hardness, but as it passes though the RO unit the chlorides decrease (like they should) and the hardness increases (it should not).

In house 9670 the hardness is 493 mg/L after the ion-exchange unit which indicates that the unit is not working.

*Cited in Montgomery, J. M., Water Treatment Principles & Design, New York, John Wiley & Sons, Inc., 1985

Table 2. Reverse Osmosis Membrane Characteristics (After NALCO, 1983(2))

	Type membrane		
	Triacetate hollow fibers	Polyamide hollow fibers	Cellulose acetate spiral wound
Flux at 400 lb/in^2, $gpd.ft^2$	1.5	1.0	15-18
Back-pressure, lb/in^2	75	50	0
pH range	4-7.5	4-11	4-6.5
Maximum temperature, °F	100°	110°	100°
Cl_2, maximum mg/L	1.0	0.1	1.0
Bioresistance	Good	Excellent	Fair
Backflushing	Ineffective	Ineffective	Effective
Silt density index (SDI)	4.0	4.0	7.0

Each unit is maintained by the occupants of the house which means they must recharge the ion-exchange unit with salt and replace the membrane (which is a cartridge) in the RO unit. If units are not properly maintained, water quality could actually decrease. Also, in at least one house the occupants never use the treated water, thus this unit's maintenance may have never been performed.

Table 3. Typical Passage of Ions Across Reverse Osmosis Membranes (After NALCO, 1983(2))

Ions	% passage	% rejection
Ammonium	8	92
Sodium	5	95
Potassium	5	95
Magnesium	3	97
Strontium	3	97
Calcium	2	98
Nitrate	15	85
Bisilicate	10	90
Chloride	5	95
Fluoride	5	95
Bicarbonate	5	95
Sulfate	3	97
Phosphate	1	99

*Excluding heavy metal ions, which in fresh water are often colloidal compounds rather than ions and thus tend to foul the membrane.

Note: CO_2, O_2, and N_2 gases generally pass through readily and may actually be enriched in the permeate. The same is true of certain organics of smaller size than the pore diameter; for example, phenol is enriched in the permeate.

The water quality must also be considered. Table 2 lists RO membrane characteristics for three different types of membranes. The cellulose acetate membrane is currently used in the RO units and may be deteriorating because the pH of the water averages in the mid sevens (7.5) which is above the operating conditions (4-6.5). The polyamide membrane is not suitable because the chlorine concentration (0.4-0.5 mg/L) is above the operating condition (0.1 mg/L Chlorine) so deterioration would occur. From this list the only suitable membrane would be the triacetate membrane. Before considering changing membrane types recheck your cellulose acetate membrane literature or check with vendor for the maximum pH level the membrane may tolerate.

Table 4. Typical Reverse Osmosis Performance (After NALCO, 1983(2))

	Constituent, mg/L	
	Raw	Finished
Hardness, as $CaCO_3$	380	20
Alkalinity, as $CaCO_3$	215	16
Total electrolyte, as $CaCO_3$	445	29
Silica, as SiO_2	25	3
pH	7.2	6.0
CO_2	25	25
CO, mg/L as O_2	6	0

Typical passage of ions across RO membranes are located in Table 3 and typical RO performance is located in Table 4.

D. Sanitary System: Only one of the four sites sampled along the sanitary system requires discussion. A large oil and grease sample was noted on one of the sampling days at the Auto Hobby Shop. Noting that the concentration the day before and after was much lower, it is almost certain that the oil and grease were discharged into the system downstream of the oil/water separator. Education and strict enforcement on waste oil disposal should be implemented.

E. Oil/Water Separators: Oil and grease were found in large concentrations at Washrack 38, the Tire Shop, the Fuel System Repair Shop, and the Engine Test Cell Shop.

1. The Washrack 38 separator water concentration of oil and grease would be expected with the type of separator installed and the fact that the soap will cause the oil and grease to be emulsified in the water.

2. The Tire Shop separator water contained high concentrations of total hydrocarbons and oil and grease, but there was a definite separation between the top and bottom (effluent) of the liquid. Chromium and copper were also noted in the sample. These concentrations (Cr,Cu) are of concern because precipitation of these metals could cause sludge at the bottom of the separator to become hazardous waste.

3. The Fuel System Repair Shop separator water contained very large concentrations of total petroleum hydrocarbons and oil and grease. These concentrations are due to improperly designed fuel/water separators. Fuel was seen on top of both the fuel side and the water side of the separator. Civil engineering should review the design of this separator and take corrective actions.

4. The Engine Test Cell Shop separator sample contained large amounts of oil and grease. The separator was of crude design and showed evidence of solids (possibly fecal matter) floating on top of the water. The separator should be evaluated by CE to determine if an upgrade would be feasible.

F. Wastewater Treatment Plant: Our intent for the WWTP was to sample for some of the key parameters to insure that the plant was working properly and not to do a WWTP evaluation. Our findings did reveal that the filterable solids (residue) were very high both coming into and leaving the plant.

The solids data, shown in Appendix B, should be confirmed by the WWTP because of confusing, non-typical results. If the results are correct, a WWTP evaluation should be performed. This evaluation should include sampling before and after each stage of the treatment process for things such as BOD, COD, solids, etc. Since we do not have any biochemical oxygen demand (BOD) data, it is hard to determine what the problems could be in the plant because design criteria for trickling filters are based on BOD. Past data from the base indicates that the BOD concentrations in the influent are much lower than what a typical trickling filter plant BOD loading is designed for. Without the dedication, hard work, and knowledge of the treatment plant operators the plant would not be operational at all. Any problems occurring at the treatment plant are not the result of the operation of the plant but are due to the design, influent concentrations, spills, etc. The low BOD readings could be the dilution caused by a cross connection.

The trickling filters had a very dark green microbial film, which is good. One concern is the media size in the trickling filter. Preferred practice specifies 3-4.5 inch crushed stone, not the large rocks being use now. The large rock media drastically reduces the surface area where the microbial film is attached, thus reducing the amount of organisms that can feed on the waste. This could be part of the solids mystery.

It was brought to our attention that a chemical was being used in the cooling towers that was both a corrosion inhibitor and a biological inhibitor. When this was used, a green color was noticed throughout the plant, and it inhibited some of the biological growth on the media and reduced efficiency. A very large slug of this product could stress the filters. Civil engineering may want to re-evaluate this product and use two separate products for corrosion control and biological control. When corrosion control is needed the biological inhibitor is also introduced to the system, which puts unneeded stress on the treatment plant.

A slug of JP-4 was introduced to the collection system during our visit. The plant operators observed an 1/8 to 1/4 inch of floating JP-4 on the 90-ft diameter primary settling tank. This worked out to be a minimum of 500 gallons of fuel. The slug was traced back to the fuels area near bldg 550 where truck washing was being done. Either a fuel dump from one of the trucks

or a water dump causing a flushing of the fuel/water separator caused the large amount of JP-4 to be introduced to the WWTP.

V. RECOMMENDATIONS

A. Civil Engineering should review the specifications and operation of the filter system at Waterdog.

B. Continue to use drinking water well #5 until it is exausted and only use well #8 after well #5 has been exhausted.

C. Consult the vendor of the RO units to verify that the membrane matches the water quality being treated.

D. Conduct a test using ten housing units. Sample five houses without notification taking one sample after the ion-exchanger and one sample after the RO unit for each house. Compare those results with samples from five housing units that have recently recharged the ion-exchanger and have installed a new RO membrane. This should indicate if the problems are due to operator maintenance.

E. Education is the solution for pollution at the Auto Hobby Shop.

F. Before disposing of the sludge in the O/W separator at the Tire Shop, sample it for hazardous waste.

G. Civil Engineering should redesign the O/W separator at the Fuel System Repair.

H. Civil Engineering should evaluate the possible upgrade of the O/W separator behind the Engine Test Cell.

I. Change chemicals used in the cooling towers.

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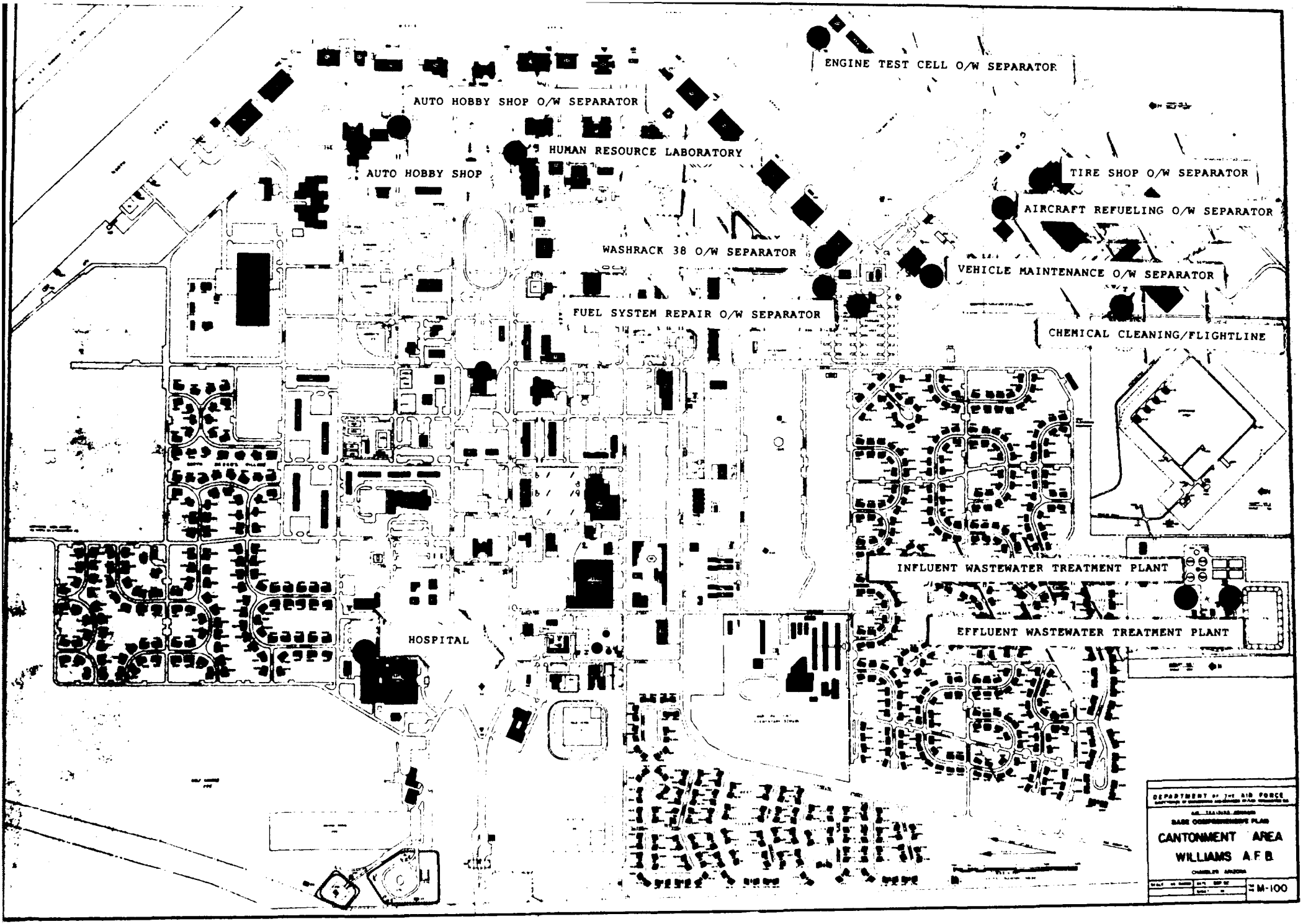
Appendix A

Base Map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AUTO HOBBY SHOP O/W SEPARATOR
HUMAN RESOURCE LABORATORY
AUTO HOBBY SHOP
TIRE SHOP O/W SEPARATOR
AIRCRAFT REFUELING O/W SEPARATOR
WASHRACK 38 O/W SEPARATOR
VEHICLE MAINTENANCE O/W SEPARATOR
FUEL SYSTEM REPAIR O/W SEPARATOR
CHEMICAL CLEANING/FLIGHTLINE
INFLUENT WASTEWATER TREATMENT PLANT
EFFLUENT WASTEWATER TREATMENT PLANT
HOSPITAL
DEPARTMENT OF THE AIR FORCE
BASE COMPREHENSIVE PLAN
CANTONMENT AREA
WILLIAMS A.F.B.
CHANDLER, ARIZONA
M-100

Appendix B

Site Descriptions and Sampling Data

Index of Appendix B

SAMPLE SITE IDENTIFICATION: INFLUENT WASTEWATER TREATMENT PLANT

DATE SAMPLE: 29 NOV 90 THRU 5 DEC 90

DAYS OF SAMPLING: 7 DAYS

METHOD OF SAMPLING: 24 HOUR COMPOSITE

SITE DESCRIPTION: Influent samples were taken from the 40 ft deep dry well located inside the treatment plant area. The sewage was gray in color and had a fecal odor each day. There were no obvious visual indication of heavy industrial influence during most of the sampling period, except on 1 Dec 90 when fuel from fuel storage entered the William's wastewater collection system. It was observed and noted that large amounts of fuel (over 350 gallons) was introduced to the treatment facility that day.

INFLUENT

TESTS	Units	29 NOV 90	30 NOV 90	1 DEC 90	2 DEC 90	3 DEC 90	4 DEC 90	5 DEC 90
pH	pH	7.82	7.56	7.30	7.43	7.76	7.47	7.25
SOLIDS (RESIDUE):								
Filterable Residue	mg/L	1820	2050	1840	1614	2175	1855	1976
Nonfilterable Residue	mg/L	130	110	130	48	15	90	60
Settleable Residue	ml/L	3.3	6.2	10.9	2.3	2.1	2.4	1.4
Total Residue	mg/L	1965	2200	1852	1793	2205	2205	2027
Volatile Residue		470	472	435	414	675	570	645
Oil & Grease	mg/L	11.0	16.0	4.2	12.0	20.9	18.2	11.2
Total hydrocarbons	mg/L	1.3	10.0	0.6	8.8	4.8	4.8	1.3
Phenol	ug/L	26	38	25	27	33	33	ns
Cyanide	mg/L	<0.005	.008	<0.005	<0.005	.015	.008	.008
ICP METAL SCREEN:								
Arsenic	ug/L	<10	<10	<10	<10	<10	<10	<10
Barium	ug/L	120	130	190	190	120	150	150
Beryllium	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Calcium	mg/L	219	267	237	242	233	236	274
Chromium	ug/L	<10	267	<10	<10	<10	<10	<10
Copper	ug/L	40	50	93	140	52	60	55
Iron	ug/L	260	220	1000	1200	260	390	310
Manganese	ug/L	30	20	30	28	<15	21	20
Zinc	ug/L	52	46	130	200	75	82	93
Aluminum	ug/L	<200	<200	550	930	270	280	240
Cobalt	ug/L	<50	<50	<50	<50	<50	<50	<50
Titanium	ug/L	<20	<20	<20	<20	<20	<20	<20
Vanadium	ug/L	<50	<50	<50	<50	<50	<50	<50
Molybdenum	ug/L	<20	<20	<20	<20	<20	<20	<20
Mercury	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Magnesium	mg/L	45.6	50	53.6	49.7	48.3	51.1	59
Lead	ug/L	<5.0	<5.0	14	24	6.0	7.0	58
VOLATILE HALOCARBON (601):								
Bromodichloromethane	ug/L	<0.4	<0.4	<0.4	<0.4	<0.4	9.5	<0.4
Bromoform	ug/L	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Carbon Tetrachloride	ug/L	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorobenzene	ug/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Chloroethane	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
Chloroform	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3	15.0	<0.3
Chloromethane	ug/L	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Chlorodibromomethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	ug/L	<0.7	3.0	2.2	2.4	1.8	<0.7	1.4
Dichlorodifluoromethane	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
1,1-Dichloroethane	ug/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,2-Dichloroethane	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,1-Dichloroethene	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
trans-1,2-Dichloroethene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
cis-1,3-Dichloropropene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropen	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Methylene chloride	ug/L	<0.4	0.6	0.7	<0.4	trace	<0.4	10
1,1,2,2-Tetrachloroethan	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	ug/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
1,1,1-Trichloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	ug/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Vinyl chloride	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
Bromomethane	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
2-Chloroethylvinyl ether	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
VOLATILE AROMATICS (602):								
1,3-Dichlorobenzene	ug/L	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	ug/L	7.0	2.5	<0.7	<0.7	3.1	ns	1.4
Ethyl Benzene	ug/L	0.5	<0.3	10.1	2.7	1.3	<0.3	<0.3
Chlorobenzene	ug/L	<0.6	0.9	4.9	1.3	<0.6	<0.6	<0.6
Toluene	ug/L	24.6	<0.3	<0.3	<0.3	3.9	<0.3	<0.3
Benzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	ns	<1.0

SAMPLE SITE IDENTIFICATION: EFFLUENT WASTEWATER TREATMENT PLANT

DATE SAMPLE: 29 NOV 90 THRU 5 DEC 90

DAYS OF SAMPLING: 7 DAYS

METHOD OF SAMPLING: 24 HOUR COMPOSITE

SITE DESCRIPTION: Samples were taken from the outfall of the chlorine contact chamber. The visual appearance of the effluent was clear.

Bioassay samples were taken from this location on the 4 Dec 90. Total toxic organic (TTO) samples were also taken.

EFFLUENT

TESTS	Units	29 NOV 90	30 NOV 90	1 DEC 90	2 DEC 90	3 DEC 90	4 DEC 90	5 DEC 90
pH	pH	7.54	6.53	7.30	7.43	7.13	7.20	7.25
Temp	C	17.5	17.0	17.9	17.2	18.1	17.7	17.7
Turbidity	ntu	7.5	7.8	ns	8.3	7.0	ns	7.6
Chlorine	mg/L	1.5	>2.0	1.2	1.5	1.2	1.5	1.5
SOLIDS (RESIDUE):								
Filterable Residue	mg/L	1620	1645	1611	1884	1757	2166	1944
Nonfilterable Residue	mg/L	4	11	4	3	16	22	12
Settleable Residue	ml/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total Residue	mg/L	1733	1748	1690	1890	1788	2190	2120
Oil & Grease	mg/L	4.2	2.9	6.6	6.0	21.4	1.3	3.5
Total hydrocarbons	mg/L	4.2	0.6	0.3	5.8	17.3	1.3	1.3
Phenol	ug/L	11	10	12	10	<10	19	ns
Cyanide	mg/L	.027	.027	.030	.027	.020	.013	ns
ICP METAL SCREEN:								
Arsenic	ug/L	<10	<10	<10	<10	<10	<10	<10
Barium	ug/L	120	110	120	120	120	110	120
Beryllium	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Calcium	mg/L	237	246	228	244	239	207	236
Chromium	ug/L	<10	<10	<10	<10	<10	<10	<10
Copper	ug/L	<25	<25	<25	<25	<25	<25	<25
Iron	ug/L	<100	<100	110	<10(	<100	100	<100
Manganese	ug/L	16	16	16	1[illegible]	<15	<15	<15
Zinc	ug/L	39	100	44	41	38	33	36
Aluminum	ug/L	<200	<200	<200	<200	<200	<200	<200
Cobalt	ug/L	<50	<50	<50	<50	<50	<50	<50
Titanium	ug/L	<20	<20	<20	<20	<20	<20	<20
Vanadium	ug/L	<50	<50	<50	<50	<50	<50	<50
Molybdenum	ug/L	<20	<20	<20	<20	<20	<20	<20
Mercury	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Magnesium	mg/L	53.6	54.4	48.3	53.3	52.6	48.9	52.7
VOLATILE HALOCARBON (601):								
Bromodichloromethane	ug/L	<0.4	<0.4	<0.4	1.3	<0.4	<0.4	<0.4
Bromoform	ug/L	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Carbon Tetrachloride	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorobenzene	ug/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Chloroethane	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
Chloroform	ug/L	<0.3	<0.3	trace	0.6	<0.3	<0.3	<0.3
Chloromethane	ug/L	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Chlorodibromomethane	ug/L	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	ug/L	<0.7	<0.7	<0.7	<0.7	<0.7	1.1	<0.7
Dichlorodifluoromethane	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
1,1-Dichloroethane	ug/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,2-Dichloroethane	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,1-Dichloroethene	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
trans-1,2-Dichloroethene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
cis-1,3-Dichloropropene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropen	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Methylene chloride	ug/L	<0.4	0.6	<0.4	0.6	<0.4	<0.4	<0.4
1,1,2,2-Tetrachloroethan	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	ug/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
1,1,1-Trichloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	ug/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Vinyl chloride	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
Bromomethane	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
2-Chloroethylvinyl ether	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
VOLATILE AROMATICS (602):								
1,3-Dichlorobenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	ug/L	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ethyl Benzene	ug/L	<0.3	<0.3	1.2	<0.3	<0.3	<0.3	<0.3
Chlorobenzene	ug/L	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Toluene	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Benzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

SAMPLE SITE IDENTIFICATION: CHEMICAL CLEAN/FLIGHTLINE MANHOLE

DATE SAMPLE: 29 NOV 90 THRU 5 DEC 90

DAYS OF SAMPLING: 5 DAYS

METHOD OF SAMPLING: 24 HOUR COMPOSITE

SITE DESCRIPTION: Samples were taken from the manhole near the flightline taxiway directly behind building 1085.

On numerous occasions during the survey the waste from this location had a fluorescent green color. The NDI operation which is connected to the collection line was the contributor, confirmed by using NDI's fluorescent light on a sample from the manhole.

Samples were not taken from this location on the 1st and 2nd of December 1990. A majority of the operations which influence this location were closed during this time frame.

CHEMICAL CLEAN

TEST		29 NOV 9	30 NOV 90	1 NOV 90	4 NOV 90	5 NOV 90
pH	pH	7.77	7.3	ns	8.00	7.87
Chemical Oxygen Demand(COD)	mg/L	495	190	340		
Oil Grease	mg/L	14.4	240	6.9	20.8	106
Total Hydrocarbon	mg/L	2.1	6.4	.6	1.3	105.6
Ammonia	mg/L	23.4	17.8	48.8	99.8	70.2
ICP METAL SCREEN:						
Arsenic	ug/L	<10	<10	<10	<10	<10
Barium	ug/L	130	98	120	100	160
Beryllium	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium	ug/L	11	<5.0	<5.0	5.0	27
Calcium	mg/L	233	212	214	231	251
Chromium	ug/L	23	<17	28	<10	76
Copper	ug/L	89	<25	64	46	60
Iron	ug/L	<100	390	3900	3500	7000
Manganese	ug/L	36	22	18	28	52
Zinc	ug/L	130	43	120	79	230
Aluminum	ug/L	410	<200	2200	1900	4100
Cobalt	ug/L	<50	<50	<50	<50	<50
Titanium	ug/L	<20	<20	<20	<20	<20
Vanadium	ug/L	<50	<50	<50	<50	<50
Molybdenum	ug/L	<20	<20	<20	<20	<20
Mercury	ug/L	<0.5	<0.5	11	<0.5	<0.5
Magnesium	mg/L	48.4	44.8	50.4	49.6	50.5
Lead	ug/L	18	ns	16	ns	44
Silver	ug/L	140	ns	200	ns	120
VOLATILE HALOCARBON (601):						
Bromodichloromethane	ug/L	<0.4	<0.4	<0.4	<0.4	<0.4
Bromoform	ug/L	<0.7	<0.7	<0.7	<0.7	<0.7
Carbon Tetrachloride	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorobenzene	ug/L	<0.6	<0.6	<0.6	<0.6	<0.6
Chloroethane	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9
Chloroform	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3
Chloromethane	ug/L	<0.8	<0.8	<0.8	<0.8	<0.8
Chlorodibromomethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,2 Dichlorobenzene	ug/L	<1.0	<1.0	3.1	<1.0	<1.0
1,3 Dichlorobenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,4 Dichlorobenzene	ug/L	<0.7	<0.7	<0.7	<0.7	1.2
Dichlorodifluoromethane	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9
1,1 Dichloroethane	ug/L	<0.4	<0.4	<0.4	<0.4	<0.4
1,2 Dichloroethane	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3
1,1 Dichloroethane	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3
trans-1,2-Dichloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,2 Dichloropropane	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3
cis-1,3-Dichloropropene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropen	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methylene chloride	ug/L	<0.4	6.9	0.7	<0.4	<0.4
1,1,2,2-Tetrachloroethan	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	ug/L	<0.6	<0.6	<0.6	<0.6	<0.6
1,1,1-Trichloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	ug/L	<0.4	<0.4	<0.4	<0.4	<0.4
Vinyl chloride	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9
Bromomethane	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9
2-Chloroethylvinyl ether	ug/L	<0.9	<0.9	<0.9	<0.9	<0.9
VOLATILE AROMATICS (602):						
1,3-Dichlorobenzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	ug/L	7.1	ns	<0.7	<0.7	<0.7
Ethyl Benzene	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3
Chlorobenzene	ug/L	<0.6	<0.6	<0.6	<0.6	<0.6
Toluene	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3
Benzene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0

SAMPLE SITE IDENTIFICATION: AUTO HOBBY SHOP

DATE SAMPLED: 3 DEC 90 THRU 6 DEC 90

DAYS OF SAMPLING: 3 DAYS

METHOD OF SAMPLING: 24 HOUR COMPOSITE

SITE DESCRIPTION: Samples were collected from a shallow manhole at the north corner of building 491. The manhole depth was approximately 2 feet. This site had very constant flow during the duration of the sampling period. There were no visual infractions observed.

AUTO HOBBY

TEST		4 DEC 90	5 DEC 90	6 DEC 90
pH	pH	7.4	7.82	7.77
Surfactants (MBAS)	mg/L	ns	0.1	0.5
Chemical Oxygen Demand(COD)	mg/L	135	135	430
Kjeldahl Nitrogen	mg/L	ns	15.5	20.5
Ammonia	mg/L	5.92	4.84	2.8
SOLIDS (RESIDUE):				
Filterable Residue	mg/L	1444	1628	1355
Nonfilterable Residue	mg/L	8.0	10	140
Settleable Residue	ml/L	0.5	<0.2	2.3
Total Residue	mg/L	1454	1628	1355
Volatile Residue	mg/L	274	560	531
Oil & Grease	mg/L	1.6	1190	40
Total hydrocarbons	mg/L	2.4	1184	11.2
Phenol	ug/L	17	27	35
Cyanide	mg/L	<0.005	ns	<0.005
ICP METAL SCREEN:				
Arsenic	ug/L	<10	<10	<10
Barium	ug/L	98	91	121
Beryllium	ug/L	<5.0	<5.0	<5.0
Cadmium	ug/L	<5.0	<5.0	<5.0
Calcium	mg/L	228	213	236
Chromium	ug/L	<10	<10	<10
Copper	ug/L	<25	31	<25
Iron	ug/L	380	690	460
Manganese	ug/L	31	61	110
Zinc	ug/L	110	310	120
Aluminum	ug/L	<200	260	<200
Cobalt	ug/L	<50	<50	<50
Titanium	ug/L	<20	<20	<20
Vanadium	ug/L	<50	<50	<50
Molybdenum	ug/L	<20	<20	<20
Mercury	ug/L	<0.5	0.7	<0.5
Magnesium	mg/L	48.9	45.5	50.5
VOLATILE HALOCARBON (601):				
Bromodichloromethane	ug/L	<0.4	<0.4	<0.4
Bromoform	ug/L	<0.7	<0.7	<0.7
Carbon Tetrachloride	ug/L	<0.5	<0.5	<0.5
Chlorobenzene	ug/L	<0.6	<0.6	<0.6
Chloroethane	ug/L	<0.9	<0.9	<0.9
Chloroform	ug/L	<0.3	<0.3	<0.3
Chloromethane	ug/L	<0.8	<0.8	<0.8
Chlorodibromomethane	ug/L	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	ug/L	<1.0	<1.0	9.1
1,3-Dichlorobenzene	ug/L	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	ug/L	62	57	<0.7
Dichlorodifluoromethane	ug/L	<0.9	<0.9	<0.9
1,1-Dichloroethane	ug/L	<0.4	<0.4	<0.4
1,2-Dichloroethane	ug/L	<0.3	<0.3	<0.3
1,1-Dichloroethene	ug/L	<0.3	<0.3	<0.3
trans-1,2-Dichloroethene	ug/L	<0.5	<0.5	<0.5
1,2-Dichloropropane	ug/L	<0.3	<0.3	<0.3
cis-1,3-Dichloropropene	ug/L	<0.5	<0.5	<0.5
trans-1,3-Dichloropropen	ug/L	<0.5	<0.5	<0.5
Methylene chloride	ug/L	<0.4	<0.4	<0.4
1,1,2,2-Tetrachloroethan	ug/L	<0.5	<0.5	<0.5
Tetrachloroethylene	ug/L	<0.6	<0.6	<0.6
1,1,1-Trichloroethane	ug/L	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	ug/L	<0.5	<0.5	<0.5
Trichloroethylene	ug/L	<0.5	<0.5	<0.5
Trichlorofluoromethane	ug/L	<0.4	<0.4	<0.4
Vinyl chloride	ug/L	<0.9	<0.9	<0.9
Bromomethane	ug/L	<0.9	<0.9	<0.9
2-Chloroethylvinyl ether	ug/L	<0.9	<0.9	<0.9
VOLATILE AROMATICS (602):				
1,4-Dichlorobenzene	ug/L	<0.5	<0.5	ns
Ethyl Benzene	ug/L	<0.7	<0.7	ns
Chlorobenzene	ug/L	<0.6	<0.6	ns
Toluene	ug/L	<0.3	<0.3	ns
Benzene	ug/L	<0.5	<0.5	ns
1,2-Dichlorobenzene	ug/L	<1.0	<1.0	ns

SAMPLE SITE IDENTIFICATION: HUMAN RESOURCE LABORATORY

DATE SAMPLED: 3 DEC 90 THRU 6 DEC 90

DAYS OF SAMPLING: 3 DAYS

METHOD OF SAMPLING: 24 HOUR COMPOSITE

SITE DESCRIPTION: Samples were taken from the manhole at the corner of first and D streets, near Building 561. The samples were taken from a depth of approximately 15 feet. This location had a very high and constant flow during the sampling period. From a visual standpoint samples seem to be basically domestic waste.

HRL

TEST		4 DEC 90	5 DEC 90	6 DEC 90
pH	pH	8.0	8.04	7.77
Surfactants (MBAS)	mg/L	.1	.2	.1
Chemical Oxygen Demand (COD)	mg/L	205	250	350
Kjeldahl Nitrogen	mg/L	34	32.5	30
Ammonia	mg/L	30.2	30	1.57
SOLIDS (RESIDUE):				
Filterable Residue	mg/L	1795	1960	2298
Nonfilterable Residue	mg/L	125	120	56
Settleable Residue	ml/L	10.5	4.2	1.3
Total Residue	mg/L	1914	2009	2402
Volatile Residue	mg/L	681	710	886
Oil & Grease	mg/L	41.6	13.5	9.9
Total hydrocarbons	mg/L	41.6	3.5	3.7
Phenol	ug/L	27	128	34
Cyanide	mg/L	.067	.063	.085
ICP METAL SCREEN.				
Arsenic	ug/L	<10	<10	<10
Barium	ug/L	120	140	160
Beryllium	ug/L	<5.0	<5.0	<5.0
Cadmium	ug/L	<5.0	<5.0	<5.0
Calcium	mg/L	257	306	300
Chromium	ug/L	<10	12	12
Copper	ug/L	40	38	30
Iron	ug/L	78	86	340
Manganese	ug/L	27	23	67700
Zinc	ug/L	76	110	76
Aluminum	ug/L	290	430	<200
Cobalt	ug/L	<50	<50	<50
Titanium	ug/L	<20	<20	<20
Vanadium	ug/L	<50	<50	<50
Molybdenum	ug/L	<20	<20	<20
Mercury	ug/L	<0.5	<0.5	<0.5
Magnesium	mg/L	51.3	67.8	67.[illegible]
Lead	ug/L	<5.0	<5.0	<5.0
VOLATILE HALOCARBON (601):				
Bromodichloromethane	ug/L	<0.4	<0.4	<0.4
Bromoform	ug/L	<0.7	<0.7	<0.7
Carbon Tetrachloride	ug/L	<0.5	<0.5	<0.5
Chlorobenzene	ug/L	<0.6	<0.6	<0.6
Chloroethane	ug/L	<0.9	<0.9	<0.9
Chloroform	ug/L	<0.3	<0.3	<0.3
Chloromethane	ug/L	<0.8	<0.8	<0.8
Chlorodibromomethane	ug/L	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0
1,3 Dichlorobenzene	ug/L	<0.5	<0.5	<0.5
1,4 Dichlorobenzene	ug/L	<0.7	19	12
Dichlorodifluoromethane	ug/L	<0.9	<0.9	<0.9
1,1-Dichloroethane	ug/L	<0.4	<0.4	<0.4
1,2 Dichloroethane	ug/L	<0.3	<0.3	<0.3
1,1-Dichloroethene	ug/L	<0.3	<0.3	<0.3
trans-1,2-Dichloroethene	ug/L	<0.5	<0.5	<0.5
1,2-Dichloropropane	ug/L	<0.3	<0.3	<0.3
cis-1,3 Dichloropropene	ug/L	<0.5	<0.5	<0.5
trans-1,3-Dichloropropen	ug/L	<0.5	<0.5	<0.5
Methylene chloride	ug/L	<0.4	175	12
1,1,2,2-Tetrachloroethan	ug/L	<0.5	<0.5	<0.5
Tetrachloroethylene	ug/L	<0.6	<0.6	<0.6
1,1,1-Trichloroethane	ug/L	<0.5	<0.5	<0.5
1,1,2 Trichloroethane	ug/L	<0.5	<0.5	<0.5
Trichloroethylene	ug/L	<0.5	<0.5	<0.5
Trichlorofluoromethane	ug/L	<0.4	<0.4	<0.4
Vinyl chloride	ug/L	<0.9	<0.9	<0.9
Bromomethane	ug/L	<0.9	<0.9	<0.9
2-Chloroethylvinyl ether	ug/L	<0.9	<0.9	<0.9
VOLATILE AROMATICS (602):				
1,4-Dichlorobenzene	ug/L	ns	<0.5	ns
Ethyl Benzene	ug/L	ns	<0.3	<0.3
Chlorobenzene	ug/L	ns	<0.6	<0.6
Toluene	ug/L	ns	<0.3	ns
Benzene	ug/L	ns	<0.5	<0.5
1,2-Dichlorobenzene	ug/L	ns	<1.0	ns

SAMPLE SITE IDENTIFICATION: HOSPITAL

DATE SAMPLE: 28 NOV 90 THRU 5 DEC 90

DAYS OF SAMPLING: 3 DAYS

METHOD OF SAMPLING: 24 HOUR COMPOSITE

SITE DESCRIPTION: Samples were taken from a manhole located in front of the facility in the thoroughfare area of the parking lot. The manhole was approximately 15 feet deep. The flow from this site was heavy and constant. During the three day sampling period there were no visual infraction observed.

HOSPITAL

TEST	Units	4 DEC 90	5 DEC 90	6 DEC 90
pH	pH	7.77	7.3	7.96
Chemical Oxygen Demand(COD)	mg/L	100	400	350
Boron	ug/L	1500	9000	1400
Cyanide	mg/L	<0.005	<0.005	<0.005
ICP METAL SCREEN:				
Arsenic	ug/L	nst	<10	<10
Barium	ug/L	nst	140	160
Beryllium	ug/L	nst	<5.0	<5.0
Cadmium	ug/L	nst	<5.0	<5.0
Calcium	mg/L	nst	306	300
Chromium	ug/L	nst	17	12
Copper	ug/L	nst	38	30
Iron	ug/L	nst	34	760
Manganese	ug/L	nst	21	25
Zinc	ug/L	nst	120	140
Aluminum	ug/L	nst	250	520
Cobalt	ug/L	nst	<50	<50
Titanium	ug/L	nst	<20	<20
Vanadium	ug/L	nst	<50	<50
Molybdenum	ug/L	nst	<20	<20
Mercury	ug/L	nst	<0.5	<0.5
Magnesium	mg/L	nst	68.8	58.3
Lead	ug/L	nst	<5.0	<5.0
Silver	ug/L	<10	<10	<10

note: (nst) no sample taken

SAMPLE SITE IDENTIFICATION: VEHICLE MAINTENANCE SHOP BUILDING 533 OIL/WATER SEPARATOR

DATE SAMPLED: 4 Dec 90

DAYS OF SAMPLING: 1 DAY

METHOD OF SAMPLING: GRAB SAMPLE

SITE DESCRIPTION: This site was a conventional gravity oil/water separator which services a washrack and floor drains of building 533. No visual infraction was noted.

VEHICLE MAINTENANCE SHOP (533)

TEST		30 NOV 90
Surfactants (MBAS)	mg/L	0.4
Boron	ug/L	3200
Cyanide	mg/L	.070
Phenols	ug/L	77
Oil & Grease	mg/L	7.8
Total hydrocarbons	mg/L	7.7
ICP METAL SCREEN:		
Arsenic	ug/L	<10
Barium	ug/L	180
Beryllium	ug/L	<5.0
Cadmium	ug/L	6.0
Calcium	mg/L	174
Chromium	ug/L	<10
Copper	ug/L	30
Iron	ug/L	1100
Manganese	ug/L	370
Zinc	ug/L	160
Aluminum	ug/L	690
Cobalt	ug/L	<50
Titanium	ug/L	<20
Vanadium	ug/L	<50
Molybdenum	ug/L	<20
Mercury	ug/L	<0.5
Magnesium	mg/L	34.9
VOLATILE HALOCARBON (601):		
Bromodichloromethane	ug/L	<0.4
Bromoform	ug/L	1.6
Carbon Tetrachloride	ug/L	<0.5
Chlorobenzene	ug/L	<0.6
Chloroethane	ug/L	<0.9
Chloroform	ug/L	<0.3
Chloromethane	ug/L	<0.8
Chlorodibromomethane	ug/L	<0.5
1,2-Dichlorobenzene	ug/L	<1.0
1,3-Dichlorobenzene	ug/L	<0.5
1,4-Dichlorobenzene	ug/L	<0.7
Dichlorodifluoromethane	ug/L	<0.9
1,1-Dichloroethane	ug/L	<0.4
1,2-Dichloroethane	ug/L	<0.3
1,1-Dichloroethene	ug/L	<0.3
trans-1,2-Dichloroethene	ug/L	<0.5
1,2-Dichloropropane	ug/L	<0.3
cis-1,3-Dichloropropene	ug/L	<0.5
trans-1,3-Dichloroproper.	ug/L	0.9
Methylene chloride	ug/L	<0.4
1,1,2,2-Tetrachloroethan	ug/L	<0.5
Tetrachloroethylene	ug/L	<0.6
1,1,1-Trichloroethane	ug/L	<0.5
1,1,2-Trichloroethane	ug/L	<0.5
Trichloroethylene	ug/L	<0.5
Trichlorofluoromethane	ug/L	<0.4
Vinyl chloride	ug/L	<0.9
Bromomethane	ug/L	<0.9
2-Chloroethylvinyl ether	ug/L	<0.9
VOLATILE AROMATICS (602):		
1,4-Dichlorobenzene	ug/L	<0.7
Ethyl Benzene	ug/L	<0.3
Chlorobenzene	ug/L	1.1
Toluene	ug/L	8.4
Benzene	ug/L	<0.5
1,2-Dichlorobenzene	ug/L	<1.0

SAMPLE SITE IDENTIFICATION: FUEL SYSTEM REPAIR OIL/WATER SEPARATOR BLDG 1092

DATE SAMPLED: 29 NOV 90

DAYS OF SAMPLING: 1 DAY

METHOD OF SAMPLING: GRAB SAMPLE

SITE DESCRIPTION: This shop is responsible for repairing aircraft fuel systems. Methyl ethyl ketones (MEK) and residual JP-4 are released to a two chamber designed API separator via floor drain. On the day of sampling the effluent side contained a substantial amount of fuel. Shop personnel indicated the separator does not function properly.

The holding tank for the fuel overflow was empty on the day of sampling. It was also noted that fuel vapors were being emitted from the separator. The fuel skimmer outlet pipe appeared to be constructed too far above the fluid level.

FUEL SYSTEM REPAIR (1092)

TEST		29 NOV 90
Oil & Grease	mg/L	8000
Total Hydrocarbon	mg/L	8000

SAMPLE SITE IDENTIFICATION: AUTO HOBBY SHOP OIL/WATER SEPARATOR

DATE SAMPLED: 30 NOV 90

DAYS OF SAMPLING: 1 DAY

METHOD OF SAMPLING: GRAB SAMPLE

SITE DESCRIPTION: The site was a conventional gravity oil/water separator which services a car wash directly behind the auto hobby complex. On this day the separator was very oily, and there seemed to be oil flowing over the effluent weir to a sump located outside the complex.

AUTO HOBBY O/W

TEST		30 NOV 90
Surfactants (MBAS)	mg/L	0.3
Boron	ug/L	400
Oil & Grease	mg/L	28.4
Total hydrocarbons	mg/L	25.6
ICP METAL SCREEN:		
Arsenic	ug/L	<10
Barium	ug/L	190
Beryllium	ug/L	<5.0
Cadmium	ug/L	5.0
Calcium	mg/L	242
Chromium	ug/L	<10
Copper	ug/L	56
Iron	ug/L	340
Manganese	ug/L	170
Zinc	ug/L	330
Aluminum	ug/L	<200
Cobalt	ug/L	<50
Titanium	ug/L	<20
Vanadium	ug/L	<50
Molybdenum	ug/L	<20
Mercury	ug/L	<0.5
Magnesium	mg/L	54.9

SAMPLE SITE IDENTIFICATION: WASHRACK 38 OIL/WATER SEPARATOR

DATE SAMPLED: 29 NOV 90

DAYS OF SAMPLING: 1 DAY

METHOD OF SAMPLING: GRAB SAMPLE

SITE DESCRIPTION: This site was a conventional gravity oil/water separator which services an aircraft washrack at building 38. The effluent from this separator feed into the wastewater collection system.

WASHRACK 38

TEST		29 NOV 90
Boron	ug/L	2900
Surfactants (MBAS)	mg/L	0.2
Oil & Grease	mg/L	992
Total hydrocarbons	mg/L	160
ICP METAL SCREEN:		
Arsenic	ug/L	<10
Barium	ug/L	160
Beryllium	ug/L	<5.0
Cadmium	ug/L	230
Calcium	mg/L	218
Chromium	ug/L	46
Copper	ug/L	72
Iron	ug/L	1700
Manganese	ug/L	32
Zinc	ug/L	350
Aluminum	ug/L	830
Cobalt	ug/L	<50
Titanium	ug/L	25
Vanadium	ug/L	<50
Molybdenum	ug/L	<20
Mercury	ug/L	<0.5
Magnesium	mg/L	45.8
VOLATILE HALOCARBON (601):		
Bromodichloromethane	ug/L	<0.4
Bromoform	ug/L	<0.7
Carbon Tetrachloride	ug/L	<0.5
Chlorobenzene	ug/L	<0.6
Chloroethane	ug/L	<0.9
Chloroform	ug/L	<0.3
Chloromethane	ug/L	<0.8
Chlorodibromomethane	ug/L	<0.5
1,2-Dichlorobenzene	ug/L	<1.0
1,3-Dichlorobenzene	ug/L	<0.5
1,4-Dichlorobenzene	ug/L	<0.7
Dichlorodifluoromethane	ug/L	<0.9
1,1-Dichloroethane	ug/L	<0.4
1,2-Dichloroethane	ug/L	<0.3
1,1-Dichloroethene	ug/L	<0.3
trans-1,2-Dichloroethene	ug/L	<0.5
1,2-Dichloropropane	ug/L	<0.3
cis-1,3-Dichloropropene	ug/L	<0.5
trans-1,3-Dichloropropen	ug/L	<0.5
Methylene chloride	ug/L	<0.4
1,1,2,2-Tetrachloroethan	ug/L	<0.5
Tetrachloroethylene	ug/L	<0.6
1,1,1-Trichloroethane	ug/L	<0.5
1,1,2-Trichloroethane	ug/L	<0.5
Trichloroethylene	ug/L	<0.5
Trichlorofluoromethane	ug/L	<0.4
Vinyl chloride	ug/L	<0.9
Bromomethane	ug/L	<0.9
2-Chloroethylvinyl ether	ug/L	<0.9
VOLATILE AROMATICS (602):		
NOTE: ANAYLSIS WAS NOT PERFORMED BECAUSE SAMPL		

SAMPLE SITE IDENTIFICATION: ENGINE TEST CELL OIL/WATER SEPARATOR BLDG 1540

DATE SAMPLED: 29 NOV 90

DAYS OF SAMPLING: 1 DAY

METHOD OF SAMPLING: GRAB SAMPLE

SITE DESCRIPTION: Jet engines are tested at this site. The separator is located in the rear of the cell and is cylindrical in design. The fluid was purplish in color with fecal solids visible.

ENGINE TEST CELL

TEST

Oil & Grease	mg/L	1440
Total Hydrocarbon	mg/L	160

SAMPLE SITE IDENTIFICATION: TIRE SHOP OIL/WATER SEPARATOR BLDG 1080

DATE SAMPLED: 29 NOV 90

DAYS OF SAMPLING: 1 DAY

METHOD OF SAMPLING: GRAB SAMPLE

SITE DESCRIPTION: This shop is responsible for stripping and cleaning aircraft tires. PD 680, solvents, and strippers are used in the day-to-day processes. The oil/water separator is located under the floor of the rinse room. The separator is a small two chamber vat with the connection from the influent side to effluent side located near the bottom of the separator. On this day the separator appeared to be filled to capacity.

		TIRE SHOP (1080)
TEST		30 NOV 90
Surfactants (MBAS)	mg/L	<0.1
Boron	ug/L	6000
Oil & Grease	mg/L	640
Total hydrocarbons	mg/L	640
ICP METAL SCREEN:		
Arsenic	ug/L	<10
Barium	ug/L	220
Beryllium	ug/L	<5.0
Cadmium	ug/l	210
Calcium	mg/L	178
Chromium	ug/L	1100
Copper	ug/L	2800
Iron	ug/L	1200
Manganese	ug/L	18
Zinc	ug/L	910
Aluminum	ug/L	380
Cobalt	ug/L	<50
Titanium	ug/L	<20
Vanadium	ug/L	<50
Molybdenum	ug/L	40
Mercury	ug/L	<0.5
Magnesium	mg/L	51.4
VOLATILE HALOCARBON (601):		
Bromodichloromethane	ug/L	<0.4
Bromoform	ug/L	<0.7
Carbon Tetrachloride	ug/L	<0.5
Chlorobenzene	ug/L	<0.6
Chloroethane	ug/L	<0.9
Chloroform	ug/L	<0.3
Chloromethane	ug/L	<0.8
Chlorodibromomethane	ug/L	<0.5
1,2-Dichlorobenzene	ug/L	<1.0
1,3-Dichlorobenzene	ug/L	<0.5
1,4-Dichlorobenzene	ug/L	<0.7
Dichlorodifluoromethane	ug/L	<0.9
1,1-Dichloroethane	ug/L	<0.4
1,2-Dichloroethane	ug/L	<0.3
1,1-Dichloroethene	ug/L	<0.3
trans-1,2-Dichloroethene	ug/L	<0.5
1,2-Dichloropropane	ug/L	<0.3
cis-1,3-Dichloropropene	ug/L	<0.5
trans-1,3-Dichloropropen	ug/L	<0.5
Methylene chloride	ug/L	<0.4
1,1,2,2-Tetrachloroethan	ug/L	<0.5
Tetrachloroethylene	ug/L	<0.6
1,1,1-Trichloroethane	ug/L	<0.5
1,1,2-Trichloroethane	ug/L	<0.5
Trichloroethylene	ug/L	<0.5
Trichlorofluoromethane	ug/L	<0.4
Vinyl chloride	ug/L	<0.9
Bromomethane	ug/L	<0.9
2-Chloroethylvinyl ether	ug/L	<0.9
VOLATILE AROMATICS (602):		
1,4-Dichlorobenzene	ug/L	<0.7
Ethyl Benzene	ug/L	<0.3
Chlorobenzene	ug/L	<0.6
Toluene	ug/L	1.1
Benzene	ug/L	<0.5
1,2-Dichlorobenzene	ug/L	<1.0

SAMPLE SITE IDENTIFICATION: AIRCRAFT REFUELING VEHICLE MAINTENANCE OIL/WATER SEPARATOR BUILDING 532

DATE SAMPLED: 4 Dec 90

DAYS OF SAMPLING: 1 DAY

METHOD OF SAMPLING: GRAB SAMPLE

SITE DESCRIPTION: This shop is responsible for maintaining aircraft refueling vehicles. The separator receives fuel waste and oil waste via floor drains from this operation. It was difficult to determine the actual design of the separator. Accessibility to the separator was made easy due to a manhole located in the north end of the building.

AIRCRAFT REFUELING VEHICLE MAINTENTANCE (532)

TEST		4 DEC 90
Phenols	ug/L	222
Oil & Grease	mg/L	70.4
Total hydrocarbons	mg/L	9.6
ICP METAL SCREEN:		
Arsenic	ug/L	<10
Barium	ug/L	55
Beryllium	ug/L	<5.0
Cadmium	ug/l	11
Calcium	mg/L	197
Chromium	ug/L	<10
Copper	ug/L	<25
Iron	ug/L	3000
Manganese	ug/L	220
Zinc	ug/L	160
Aluminum	ug/L	<200
Cobalt	ug/L	<50
Titanium	ug/L	<20
Vanadium	ug/L	<50
Molybdenum	ug/L	<20
Mercury	ug/L	<20
Magnesium	mg/L	42.3
Lead	ug/L	23
VOLATILE HALOCARBON (601):		
Bromodichloromethane	ug/L	<0.4
Bromoform	ug/L	<0.7
Carbon Tetrachloride	ug/L	<0.5
Chlorobenzene	ug/L	<0.6
Chloroethane	ug/L	<0.9
Chloroform	ug/L	<0.3
Chloromethane	ug/L	<0.8
Chlorodibromomethane	ug/L	<0.5
1,2-Dichlorobenzene	ug/L	<1.0
1,3-Dichlorobenzene	ug/L	<0.5
1,4-Dichlorobenzene	ug/L	<0.7
Dichlorodifluoromethane	ug/L	<0.9
1,1-Dichloroethane	ug/L	<0.4
1,2-Dichloroethane	ug/L	<0.3
1,1-Dichloroethene	ug/L	<0.3
trans-1,2-Dichloroethene	ug/L	<0.5
1,2-Dichloropropane	ug/L	<0.3
cis-1,3-Dichloropropene	ug/L	<0.5
trans-1,3-Dichloropropen	ug/L	<0.5
Methylene chloride	ug/L	<0.4
1,1,2,2-Tetrachloroethan	ug/L	<0.5
Tetrachloroethylene	ug/L	<0.6
1,1,1-Trichloroethane	ug/L	<0.5
1,1,2-Trichloroethane	ug/L	<0.5
Trichloroethylene	ug/L	<0.5
Trichlorofluoromethane	ug/L	<0.4
Vinyl chloride	ug/L	<0.9
Bromomethane	ug/L	<0.9
2-Chloroethylvinyl ether	ug/L	<0.9
VOLATILE AROMATICS (602):		
NOTE: DUE TO INTERFERING COMPOUNDS, CANNOT ACCURATELY IDE		

Appendix C

Sampling Procedures

SAMPLING PROCEDURES:

A. The following sampling locations were sampled in the time composite sampling mode during the period of 29 November thru 5 December 1990:

(1) Influent Wastewater Treatment Facility

(2) Effluent Wastewater Treatment Facility

(3) Auto Hobby Shop

(4) Hospital

(5) Flightline manhole behind building 1085.

(6) Manhole at the corner of D street and First street.

B. With the use of the 726 model Sigma Wastewater sampler, hourly equiproportional composite samples where taken from each location.

C. Grab samples were taken from the following oil/water separators during period of the 29 November thru 5 December 1990:

(1) Building 533 Vehicle Maintenance Shop

(2) Building 532 Aircraft Refueling Vehicle Maintenance

(3) Building 491 Auto Hobby Shop

(4) Building 38 Aircraft Washrack

(5) Building 1092 Fuel System Repair

(6) Building 1540 Engine Test Cell

(7) Building 1080 Wheel and Tire Shop

D. Sampling was accomplished by filling sample containers with the aqueous portion at the outfall of the oil/water separator, which flows into the wastewater collection system.

E. Grab samples were taken from the drinking water distribution system at Waterdog Recreation Facility and drinking wells #5 and #8 at Williams AFB. Samples were taken from spigots at various locations throughout the systems.

F. All samples were preserved in accordance with the next page of this report. All samples were kept at 4°C, and shipped via overnight courier to AFOEHL/SA laboratory.

SAMPLING PRESERVATION METHOD

PARAMETER	METHOD	CONTAINER	PRESERVATION
OIL & GREASE	EPA 413.2	clear glass	sulfuric acid to ph of 2
PETROLEUM HYDROCARBON	EPA 418.1	clear glass	sulfuric acid to ph of 2
ALKALINITY	EPA 310.2	cube container	cool to 4 degrees C
CHLORIDES	EPA 325.3	cube container	cool to 4 degrees C
RESIDUE	EPA 160	cube container	cool to 4 degrees C
CYANIDE	EPA 335.3	cube container	sodium hydroxide to ph of 12
PHENOLS	EPA 420.2	cube container	sulfuric acid to ph of 2
METALS	EPA 200.7	cube container	nitric acid to ph of 2
AMMONIA	EPA 350.2	cube container	sulfuric acid to ph of 2
CHEMICAL OXYGEN DEMAND	STD M 508C	cube container	sulfuric acid to pH of 2
NITROGEN	EPA 351.2	cube container	sulfuric acid to pH of 2
TOTAL TOXIC ORGANIC	2 amber liter bottles and volatile bottles		cool to 4 degrees C
SURFACTANT	EPA 425.1	cube container	cool to 4 degrees C
TURBIDITY	EPA 180.1	cube container	cool to 4 degrees C
PURGEABLE AROMATIC	EPA 602	volatile bottles	cool to 4 degrees C
PURGEABLE HALOCARBON	EPA 601	volatile bottles	cool to 4 degrees C
TRIHALOMETHANES	EPA 501	volatile bottles	sodium theosulfate

Appendix D

Drinking Water Results

BLDG		9063	9579	9670
Test		Ion-exchange unit water		
Alkalinity (bicarbonate)	mg/L	90	90	53
Alkalinity (total)	mg/L	90	90	53
Chlorides	mg/L	410	455	355
Hardness (Calc as CaCO3)	mg/L	5.9	264	493
Calcium	mg/L	1.7	21	143
Magnesium	mg/L	0.4	51	33
Sodium	mg/L	407	81	62
Test		RO unit water		
Alkalinity (bicarbonate)	mg/L	43	35	82
Alkalinity (total)	mg/L	43	35	86
Chlorides	mg/L	275	250	465
Hardness (Calc as CaCO3)	mg/L	184	296	375
Calcium	mg/L	45	84	22
Magnesium	mg/L	17	20	53
Sodium	mg/L	124	50	75

TEST		DRINKING WELL 5 STANDARD	4 DEC 90
Kjeldahl Nitrogen (Total)	mg/L		0.6
Nitrates (as Nitrogen)	mg/L		13
Nitrites (as Nitrogen)	mg/L		<0.02

TEST		DRINKING WELL 8 STANDARD	4 DEC 90
Kjeldahl Nitrogen (Total)	mg/L		0.5
Nitrates (as Nitrogen)	mg/L		5.0
Nitrites (as Nitrogen)	mg/L		<0.02

TEST		WATER DOG CABIN 21 STANDARD	30 NOV 90
Trihalomethanes (total)	ug/L		99.20
Chlorodibromomethane	ug/L		27
Bromodicholormethane	ug/L		31
Chloroform	ug/L		38
Bromoform	ug/L		3.2
Turbidity	ntu		1.2

TEST		WATER DOG CABIN 8 STANDARD	30 NOV 90
Trihalomethanes (total)	ug/L		56.3
Chlorodibromomethane	ug/L		20
Bromodicholormethane	ug/L		18
Chloroform	ug/L		15
Bromoform	ug/L		3.3
Turbidity	ntu		1.7

TEST		WATER DOG REC CENTER STANDARD	30 NOV 90
Trihalomethanes (total)	ug/L		57.4
Chlorodibromomethane	ug/L		20
Bromodicholormethane	ug/L		18
Chloroform	ug/L		15
Bromoform	ug/L		3.4
Turbidity	ntu		2.2

Appendix E

Biomonitoring Results

DEPARTMENT OF THE AIR FORCE
USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235-5501

REPLY TO ATTN OF

EHT (SSgt Smith, DSN 240-3305) 18 Dec 90

SUBJECT

NPDES Aquatic Biomonitoring Tests

TO

EQ

1. Introduction: An aquatic 48-hour static renewal, definitive toxicity test was performed on composite water sample# GN901485, from 8 - 10 Dec, which you collected from the sewage treatment plant on 4 Dec 90. Ceriodaphnia dubia and fathead minnows were used as test organisms.

2. Results:

a. Survival rates for the Ceriodaphnia dubia are as follows: 100% for concentrations 6%, 12.5%, 25% and the control, 20% for the 25% concentration and 0 survivability for 50%, 75% and 100% concentrations (Atch 1).

b. The survival rates for the fathead minnow were 100% for all concentrations with the exception of the control which was 95% (Atch 2).

c. Declorinated water and reconstituted moderately hard water was used as dilution water for the fathead minnow and Ceriodaphnia dubia tests respectfully.

3. If you have any questions or need further assistance regarding our aquatic bioassay program call SSgt Smith or Capt Holck at DSN 240-3305.

Stanley O. Hewins

STANLEY O. HEWINS, Lt Col, USAF, BSC
Chief, Environmental Biology Branch

2 Atch
1. GN901485 (C. dubia) results
2. GN901485 (fathead minnow) results

cc: HQ SAC/SGPB
HQ HSD/XAE
DET 1 AFOEHL
7100 CSW Med Cen/SGB

AQUIRE/EQUIS BIOASSAY RECORD SHEET TEST NUMBER: D0204339901

BASE SAMPLE NUMBER: GN901485 SAMPLE SITE: SEWAGE TREATMENT PLANT EFFLUENT

REQUESTING AGENCY INFORMATION

UNIT	OFC SYM	INSTALLATION	ST	ZIP
USAF HOSP	SGPB	WILLIAMS AFB	AZ	85240

REQUESTOR: LT MCLAURIN AUTOVON NUMBER: 240 1ST EXT: 3305 2ND EXT:

TRACKING INFORMATION

DATE OF RECEIPT: 06-DEC-90 PROJECT MANAGER: SSGT SMITH PROJECT TECHNICIAN: A1C DILLON
REMARKS: NPDES PERMIT
DATE/TIME SAMPLE COLLECTED/ENDED: 4-DEC-90 0845/5-DEC-90 0845

ORGANISM: CERIODAPHNIA DUBIA LC50: DURATION: 48 HOURS

ANALYTICAL INFORMATION

CONTROL WATER/TYPE: RECON MOD HARD ALKALINITY: 68 HARDNESS: 98 CL: 0 SAMPLE: ALK: 124, HARD: 774, CL: 0, COND: 2150

SAMPLE START DATA

START DATE: 08-DEC-90 START TIME: 0930

	1	2	3	4	5	6	7
STARTING NUMBER:	20	20	20	20	20	20	20
DILUTION PERCENT:	0.00	6	12.5	25	50	75	100
DO:	7.6	7.7	7.8	8.0	8.6	9.2	10.4
PH:	8.2	8.1	8.0	7.8	7.9	7.4	7.3
TEMP (C):	24.2	24.7	24.7	24.6	24.7	25.1	24.9
INTERVAL: 24 HOURS							
SURVIVING NUMBER:	20	20	20	8	0	0	0
SURVIVAL PERCENT:	100	100	100	40	0	0	0
DO:	8.1	8.4	8.6	8.8	7.8	7.9	8.0
PH:	8.2	8.0	7.9	7.7	8.2	8.2	8.1
TEMP (C):	24.2	24.5	24.4	24.7	25.0	25.0	25.0
INTERVAL: 48 HOURS							
SURVIVING NUMBER:	20	20	20	4	0	0	0
SURVIVAL PERCENT:	100	100	100	20	0	0	0
DO:	7.6	7.6	7.5	7.5			
PH:	8.0	8.2	8.2	8.2			
TEMP (C):	25.0	25.0	25.0	25.0			

INTERVAL: 72 HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
TEMP (C)

INTERVAL: 96 HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
TEMP (C):

TEST NOTES

Atch 2

AFOEHL/EQE BIOASSAY RECORD SHEET

TEST NUMBER: F0204339902

BASE SAMPLE NUMBER: GN901485

SAMPLE SITE: SEWAGE TREATMENT PLANT EFFLUENT

REQUESTING AGENCY INFORMATION

UNIT	OFC SYM	INSTALLATION	ST	ZIP
USAF HOSP	SGPB	WILLIAMS AFB	AZ	85240

REQUESTOR: LT MCLAURIN AUTOVON NUMBER: 240 1ST EXT: 3305 2ND EXT:

TRACKING INFORMATION

DATE OF RECEIPT: 06-DEC-90 PROJECT MANAGER: SSGT SMITH PROJECT TECHNICIAN: A1C DILLON

REMARKS: NPDES PERMIT

DATE/TIME SAMPLE COLLECTED/ENDED: 4-DEC-90 0845/5-DEC-90 0845

ORGANISM: PIMEPHALES PROMELAS LC50: DURATION: 48 HOURS

ANALYTICAL INFORMATION

CONTROL WATER/TYPE: DECHLORINATED H2 ALKALINITY: 280 HARDNESS: 392 CL: 0 SAMPLE: ALK: 124, HARD: 774, CL: 0, COND: 2150

SAMPLE START DATA

START DATE: 08-DEC-90 START TIME: 0930

	1	2	3	4	5	6	7
STARTING NUMBER:	20	20	20	20	20	20	20
DILUTION PERCENT:	0.00	6	12.5	25	50	75	100
DO:	6.0	6.9	7.0	7.4	8.1	8.8	9.4
PH:	7.5	7.9	7.9	7.8	7.7	7.6	7.4
TEMP (C):	19.8	19.0	19.2	19.7	19.2	19.6	19.2
INTERVAL: 24 HOURS							
SURVIVING NUMBER:	19	20	20	20	20	20	20
SURVIVAL PERCENT:	95	100	100	100	100	100	100
DO:	6.7	6.9	6.9	7.0	6.2	6.5	6.2
PH:	8.2	8.3	8.3	8.2	8.1	8.0	7.9
TEMP (C):	20.0	20.0	20.0	20.0	20.0	20.0	20.0
INTERVAL: 48 HOURS							
SURVIVING NUMBER:	19	20	20	20	20	20	20
SURVIVAL PERCENT:	95	100	100	100	100	100	100
DO:	6.4	6.5	7.0	6.9	5.7	6.4	6.5
PH:	8.3	8.3	8.3	8.3	8.1	8.1	8.0
TEMP (C):	20.0	20.0	20.0	20.0	20.0	20.0	20.0
INTERVAL: 72 HOURS							
SURVIVING NUMBER:							
SURVIVAL PERCENT:							
DO:							
PH:							
TEMP (C)							
INTERVAL: 96 HOURS							
SURVIVING NUMBER:							
SURVIVAL PERCENT:							
DO:							
PH:							
TEMP (C):							

TEST NOTES

42

Appendix F

Request Letter

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 82ND FLYING TRAINING WING (ATC)
WILLIAMS AIR FORCE BASE AZ 85240-

REPLY TO
ATTN OF USAF Hospital Williams/SGPB 3 April 1990

SUBJECT Wastewater/Water Characterization Study

TO USAF OEHL/EQ (Lt Scott)

1. The following are some of the areas of concern associated with the wastewater discharges and operations at Williams AFB. These are being forwarded per our conversation of 27 Mar 90.

a. Rinsewater from chemical cleaning operations.

b. Excessive phenols at WWTP effluent

c. High turbidity at WWTP effulent - due to insufficient solids removal.

d. High turbidity at Waterdog Recreation Area drinking water system.

e. Trihalomethane exceedances at Waterdog drinking water system.

2. Questions or comments may be directed to myself at AV 474-6516.

THOMAS P. DEVENOGE, 1Lt, USAF, BSC
Chief, Bioenvironmental Engineering Services

cc: DEEV

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR TRAINING COMMAND (ATC)
RANDOLPH AIR FORCE BASE TX 78150-5001

REPLY TO ATTN OF SGPB

4 JAN 1988

SUBJECT On-Site Waste Stream Characterization/Hazardous Waste Studies at Air Training Command Bases

TO USAFOEHL/CC

1. During the last six months three ATC bases in Texas received notices of non-compliance from the US Environmental Protection Agency. At our request the USAFOEHL Environmental Quality Branch (ECQ) performed waste stream characterization/hazardous waste studies at Reese and Sheppard AFBs to help in the responses to EPA. Laughlin AFB recently received a notice concerning operation of its waste water treatment plant (WWTP). The NPDES permit for the Laughlin WWTP expires 13 Jul 88. The EPA inspectors stated the application for renewal was due 13 Jan 88 and needed to be supported by data from a wastewater analysis. HQ ATC/SGPB perceives a need to have waste stream/hazardous waste studies performed at each of its bases to support various environmental requirements and requests USAFOEHL/ECQ to complete studies at the remaining ATC bases during the next twelve months.

2. Request waste stream characterization/hazardous waste studies be completed at ATC bases in the order listed in Attachment 1. The suggested completion dates are subject to your workload with the exception of Laughlin AFB. The data from the study for Laughlin AFB should be available by the end of the month shown to support the NPDES permit renewal application. The studies should collect sufficient data to characterize waste streams, including wastewater and WWTP influent and effluent; to determine compliance with EPA requirements; and to provide recommendations on waste handling, disposal, and minimization procedures. The attached listing does not include Reese, Sheppard, or Columbus AFBs since studies on these bases were previously requested.

3. The information listed below may already be available and you may wish to use it to avoid duplicating previous work.

a. Previous sampling conducted by Bioenvironmental Engineering Services (BES). Some bases have completed more sampling than others.

b. HQ ATC/DEEV contracted with the DoE HAZWRAP function to collect and analyze eight samples of process wastes from each ATC base. HAZWRAP will collect samples from Keesler, Lowry, and Randolph AFBs during FY88 and may collect samples from six additional bases in FY89 if funding is available. HQ ATC/DEEV will select the process sampling points. Please contact HQ ATC/DEEV, Mr. Carl Lahser or Capt David Parker, AV 487-3240, for more information and/or copies of the data.

UNITED STATES AIR FORCE

SEPTEMBER 18, 1947

c. Enid, Oklahoma, hired a contractor to study the waste streams at Vance AFB to determine pretreatment requirements for connection to the regional/municipal WWTP. This was mostly a paperwork review and sampling was probably not done. Vance AFB used the information to design an industrial waste treatment system. Please contact the Vance AFB Environmental Coordinator or HQ ATC/DEEV, Mr. Lahser, for the results of this study.

d. HQ ATC/DEEV contracted with the DoE Idaho National Engineering Laboratories (INEL) to write a waste minimization plan for Mather AFB. INEL collected information in Nov 87; they did not collect any samples. This information may be obtained through HQ ATC/DEEV, Mr. Lahser.

4. Please let us know if you can do this work and provide your schedule if the suggested completion dates are not reasonable. Contact the applicable BES offices (as shown in Atch 1) to arrange support and to request preliminary information. Please call Maj Crotchett or myself at 7-3764 if you have questions on this request.

Ronald L. Schiller

RONALD L. SCHILLER, Lt Col, USAF, BSC
Command Bioenvironmental Engineer
DCS/Medical Services & Training

1 Atch
ATC Base Priority List

cc: HQ ATC/DEEV
ATC MTFs/SGPB
HQ AFSC/SGPB

ATC PRIORITY LIST FOR
WASTE STREAM CHARACTERIZATION/HAZARDOUS WASTE STUDIES

Base	Suggested Completion Date	Base BES Point of Contact
Laughlin AFB	Mar 88	Lt O'Brien, AV 732-5259
Williams AFB	Apr 88	Lt Devenoge, AV 474-6516
Lackland AFB	May 88	Lt Vaughn, AV 473-3575
Randolph AFB	Jun 88	Capt Ballengee, AV 487-3256
Mather AFB	Jul 88	MSgt Sparks, AV 828-2284
Goodfellow AFB	Aug 88	TSgt Williams, AV 477-3123
Chanute AFB	Sep 88	Capt Davis, AV 862-4371
Lowry AFB	Oct 88	Lt Smith, AV 926-3176
Keesler AFB	Nov 88	Maj Jones, AV 868-6545
Vance AFB	Dec 88	TSgt Lamoreaux, AV 962-7241

Appendix G

TTO Results

USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY
OCCUPATIONAL CHEMISTRY (SAO)
AV240-3626
BROOKS AFB, TX 78235-5501

Exhibit T10.5

LABORATORY REPORT

Sample Matrix: Liquid
OEHL Number: Not Provided : 900742A1
Base Sample Number: GN901381
Lab Number: 862796
Analtyical Method: EPA 625 (modified)

Base Neutral TTO Compounds *	Concentration (ug/L)	Limit of Detection (ug/L)
Acenaphthene	<100	100
Acenaphthylene	<100	100
Anthracene	<100	100
Benzidine	<1,000	1,000
Benzo[a]anthracene	<100	100
Benzo[b]fluoranthene	<100	100
Benzo[k]fluoranthene	<100	100
Benzo[a]pyrene	<100	100
Benzo[ghi]perylene	<100	100
Benzyl butyl phthalate	<100	100
Bis(2-chloroethyl)ether	<100	100
Bis(2-chloroethoxy)methane	<100	100
Bis(2-chloroisopropyl) ether	<100	100
Bis(2-ethylhexyl)phthalate	<100	100
4-Bromophenyl phenyl ether	<100	100
2-Chloronaphthalene	<100	100
4-Chlorophenyl phenyl ether	<100	100
Chrysene	<100	100
Dibenz[a,h]anthracene	<100	100
Di-n-butyl phthalate	<100	100
1,2-Dichlorobenzene	<100	100
1,3-Dichlorobenzene	<100	100
1,4-Dichlorobenzene	<100	100

*TTO = Total Toxic Organics

Requesting Agency (Mailing Address):

AFOEHL/EQW Bldg 175W
Brooks AFB, TX
78235

Workcenter I.D. no.: Direct from Williams AFB
Contract Lab: Clayton Environmental Consultants
Clayton project no.: 69702-17
Date reported: 14-DEC-90
Date received: 30-NOV-90
Date prepared: 4-DEC-90

USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY
OCCUPATIONAL CHEMISTRY (SAO)
AV240-3626
BROOKS AFB, TX 78235-5501

LABORATORY REPORT

Sample Matrix:	Liquid
OEHL Number:	Not Provided 900774241
Base Sample Number:	GN901381
Lab Number:	862796
Analytical Method:	EPA 625 (modified)

Base Neutral TTO Compounds *	Concentration (ug/L)	Limit of Detection (ug/L)
3,3'-Dichlorobenzidine	<200	200
Diethyl phthalate	<100	100
Dimethyl phthalate	<100	100
2,4-Dinitrotoluene	<100	100
2,6-Dinitrotoluene	<100	100
Di-n-octylphthalate	<100	100
Fluoranthene	<100	100
Fluorene	<100	100
Hexachlorobenzene	<100	100
Hexachlorobutadiene	<100	100
Hexachlorocyclopentadiene	<100	100
Hexachloroethane	<100	100
Indeno(1,2,3-cd)pyrene	<100	100
Isophorone	<100	100
Naphthalene	<100	100
Nitrobenzene	<100	100
N-Nitrosodimethylamine	<100	100
N-Nitrosodi-n-propylamine	<100	100
N-Nitrosodiphenylamine	<100	100
Phenanthrene	<100	100
Pyrene	<100	100
1,2,4-Trichlorobenzene	<100	100

*TTO = Total Toxic Organics

Requesting Agency (Mailing Address):

AFOEHL/EQW Bldg 175W
Brooks AFB, TX
78235

Workcenter I.D. no.: Direct from Williams AFB
Contract Lab: Clayton Environmental Consultants
Clayton project no.: 69702-17
Date reported: 14-DEC-90
Date received: 30-NOV-90
Date prepared: 4-DEC-90

USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY
OCCUPATIONAL CHEMISTRY (SAO)
AV240-3626
BROOKS AFB, TX 78235-5501

LABORATORY REPORT

Sample Matrix:	Liquid
OEHL Number:	Not Provided 90074241
Base Sample Number:	GN901381
Lab Number:	862796
Analtyical Method:	EPA 625 (modified)

Acid TTO Compounds *	Concentration (ug/L)	Limit of Detection (ug/L)
4-Chloro-3-methylphenol	<100	100
2-Chlorophenol	<100	100
2,4-Dichlorophenol	<100	100
2,4-Dimethylphenol	<100	100
2,4-Dinitrophenol	<500	500
2-Methyl-4,6-dinitrophenol	<500	500
2-Nitrophenol	<100	100
4-Nitrophenol	<500	500
Pentachlorophenol	<500	500
Phenol	<100	100
2,4,6-Trichlorophenol	<100	100

*TTO = Total Toxic Organics

Requesting Agency (Mailing Address):	Workcenter I.D. no.: Direct from Williams AFB
	Contract Lab: Clayton Environmental Consultants
AFOEHL/EQW Bldg 175W	Clayton project no.: 69702-17
Brooks AFB, TX	Date reported: 14-DEC-90
78235	Date received: 30-NOV-90
	Date prepared: 4-DEC-90

USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY
OCCUPATIONAL CHEMISTRY (SAO)
AV240-3626
BROOKS AFB, TX 78235-5501

LABORATORY REPORT

Sample Matrix: Liquid
OEHL Number: Not Provided : 90074243
Base Sample Number: GN901381
Lab Number: 862796
Analtyical Method: EPA 624 (modified)

Volatile TTO Compounds *	Concentration (ug/L)	Limit of Detection (ug/L)
Acrolein	<100	100
Acrylonitrile	<100	100
Benzene	<5	5
Bromodichloromethane	<5	5
Bromoform	<5	5
Bromomethane	<10	10
Carbon tetrachloride	<5	5
Chlorobenzene	<5	5
Chloroethane	<10	10
2-Chloroethylvinylether	<10	10
Chloroform	<5	5
Chloromethane	<10	10
Dibromochloromethane	<5	5
1,2-Dichlorobenzene	<5	5
1,3-Dichlorobenzene	<5	5
1,4-Dichlorobenzene	<5	5
1,1-Dichloroethane	<5	5
1,2-Dichloroethane	<5	5
1,1-Dichloroethene	<5	5
1,2-Dichloroethene (total)	<5	5
1,2-Dichloropropane	<5	5
cis-1,3-Dichloropropene	<5	5
trans-1,3-Dichloropropene	<5	5
Ethylbenzene	<5	5
Methylene chloride	10	5
1,1,2,2-Tetrachloroethane	<5	5
Tetrachloroethene	<5	5
Toluene	<5	5
1,1,1-Trichloroethane	<5	5
1,1,2-Trichloroethane	<5	5
Trichloroethene	<5	5
Vinyl chloride	<10	10

*TTO = Total Toxic Organics

Requesting Agency (Mailing Address):

AFOEHL/EQW Bldg 175W
Brooks AFB, TX
78235

Workcenter I.D. no.: Direct from Williams AFB
Contract Lab: Clayton Environmental Consultants
Clayton project no.: 69702-17
Date reported: 14-DEC-90
Date received: 30-NOV-90
Date prepared: 10-DEC-90

AIR FORCE
OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY
BROOKS AFB, TEXAS, 78235-5501

REPORT OF ANALYSIS

BASE SAMPLE NO: GN901381 OEHL SAMPLE NO: 91024239

SAMPLE TYPE: NON-POTABLE WATER

SITE IDENTIFIER: NOXXXX DATE RECEIVED: 901219

DATE COLLECTED: 901129 DATE REPORTED: 910130

DATE EXTRACTED: 901204 DATE ANALYZED: 911214

SAMPLE SUBMITTED BY: USAF HOSP WILLIAMS/SGPB

RESULTS

Test	Results	Units
Aldrin	<0.05	ug/L
alpha-BHC	<0.05	ug/L
beta-BHC	<0.05	ug/L
delta-BHC	<0.05	ug/L
gamma-BHC	0.06	ug/L
Chlordane	<0.5	ug/L
DDD	<0.1	ug/L
DDE	<0.1	ug/L
p,p-DDT	<0.1	ug/L
Dieldrin	<0.05	ug/L
Endosulfan I	<0.05	ug/L
Endosulfan II	<0.1	ug/L
Endosulfan sulfate	<0.1	ug/L
Endrin	<0.1	ug/L
Endrin aldehyde	<0.1	ug/L
Heptachlor	<0.05	ug/L
Heptachlor epoxide	<0.05	ug/L
Toxaphene	<1.0	ug/L
Aroclor 1016	<0.5	ug/L
Aroclor 1221	<0.5	ug/L
Aroclor 1232	<0.5	ug/L
Aroclor 1242	<0.5	ug/L
Aroclor 1248	<0.5	ug/L
Aroclor 1254	<0.1	ug/L
Aroclor 1260	<0.1	ug/L

TO:

AFOEHL/EQ
BROOKS AFB TX 78235-5501

PAGE 1 (Cont'd)

Appendix H

NPDES Permit

Basement Bob Vicky EPA [illegible]
-2431 214 655-7175

Permit No. AZ0110230

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C. 125 et seq., the "Act"),

United States of America
Department of the Air Force
Williams Air Force Base, Arizona 85240-5045

is authorized to discharge from the wastewater treatment plant located in the southwest corner of Williams Air Force Base, County of Maricopa, State of Arizona,

through discharge serial No. 001, to receiving waters named Roosevelt Irrigation District Canal, at latitude 33°17'48" N, longitude 111°41'38" W,

and through discharge serial No. 002, to receiving waters named Roosevelt Water Conservation District Floodway, at latitude 33°17'47" N, longitude 111°41'37" W.

In addition, Williams Air Force Base is authorized to discharge treated metal finishing wastes from the aircraft maintenance facilities along taxiway No. 6, through discharge serial No. 003, to the base sewage collection system.

Such authorized discharges shall be in accordance with effluent limitations, monitoring requirements and other conditions set forth herein, and in the attached 12 pages of EPA Region 9 "Standard Federal NPDES Permit Conditions," dated January 29, 1988

This permit shall become effective on October 29, 1989.

and expires on October 29, 1994.

Signed this 27 day of September 1989.

For the Regional Administrator

Director, Water Management Division

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS based upon a design capacity of 3,785 m^3/day.

1. The permittee is authorized to discharge from outfall serial number 001:

a. Such discharges shall be limited and monitored as specified below:

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS						MONITORING REQUIREMENTS	
	kg/day			Other Units			Measurement	Sample
	Average		Daily Max	Average		Daily Max	Frequency	Type
	Monthly	Weekly		Monthly	Weekly			
Flow (m^3/day)	N/A**	N/A	N/A	***	***	***	Continuous	N/A
Biochemical Oxygen Demand (5 Day)*	114	170	341	30 mg/l	45 mg/l	***	Once/month	Composite
Suspended Solids*	114	170	341	30 mg/l	45 mg/l	***	Once/month	Composite
Fecal Coliform Bacteria	N/A	N/A	N/A	200/100 ml	N/A	800/100 ml	Once/month	Discrete
Settleable Solids	N/A	N/A	N/A	1 ml/l	N/A	2 ml/l	Once/month	Discrete
Total Residual Chlorine	N/A	N/A	N/A	N/A	N/A	0.05 mg/l	Daily	Discrete
pH	Not less than 6.0 nor greater than 9.0 standard units						Once/week	Discrete
Biomonitoring	Not less than 50% survival as required under I.A.3.						Once/month	Composite

* Both the influent and effluent shall be monitored. The arithmetic mean of the Biochemical Oxygen Demand (5 Day) and Suspended Solids values, by weight, for effluent samples collected in a period of 30 consecutive calendar days shall not exceed 15% of the arithmetic mean of the values, by weight, for influent samples collected at approximately the same times during the same period.

** N/A - Not applicable.

*** Monitoring and reporting required. No limit set at this time.

b. Trace substances shall be limited and monitored as specified below. All metal limits below are for metals as specified in Methods for Chemical Analysis of Water and Wastes (EPA 600/4-79-020) method 4.1.4.

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS Daily Maximum mg/l	MONITORING REQUIREMENTS Measurement Frequency	Sample Type
Arsenic (as As)	0.20	2/month	Composite
Boron (as B)	1.00	2/month	Composite
Cadmium (as Cd)	0.05	2/month	Composite
Chromium*	1.00	2/month	Composite
Copper (as Cu)	0.50	2/month	Composite
Lead (as Pb)	0.10	2/month	Composite
Manganese (as Mn)	10.0	2/month	Composite
Mercury (as Hg)	0.01	2/month	Composite
Selenium (as Se)	0.0[illegible]	2/month	Composite
Zinc (as Zn)	10.0	2/month	Composite
Cyanide (total)	0.2	2/month	Composite
Phenolics (total)	0.005	2/month	Composite

*Chromium as Cr, hexavalent and trivalent.

c. The discharge shall not cause objectionable odors at the surface of the receiving waters.

d. There shall be no discharge of floating solids, oil, grease or visible foam in other than trace amounts.

e. Samples taken in compliance with the monitoring requirements specified above shall be taken at the following locations:
Discharge serial Nos. 001 and 002

Influent samples shall be taken downstream from any additions to the trunk sewer and prior to treatment.

Effluent samples shall be taken downstream from any additions from the treatment works prior to mixing with the receiving waters.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS based upon a design capacity of 3,785 m^3/day.

2. The permittee is authorized to discharge from outfall serial number 002:

a. Such discharges shall be limited and monitored as specified below:

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS						MONITORING REQUIREMENTS	
	kg/day			Other Units			Measurement Frequency	Sample Type
	Average		Daily Max	Average		Daily Max		
	Monthly	Weekly		Monthly	Weekly			
Flow (m^3/day)	N/A**	N/A	N/A	***	***	***	Continuous	N/A
Biochemical Oxygen Demand (5 Day)*	114	170	341	30 mg/l	45 mg/l	***	Once/month	Composite
Suspended Solids*	114	170	341	30 mg/l	45 mg/l	***	Once/month	Composite
Fecal Coliform Bacteria	N/A	N/A	N/A	200/100 ml	N/A	800/100 ml	Once/month	Discrete
Settleable Solids	N/A	N/A	N/A	1 ml/l	N/A	2 ml/l	Once/month	Discrete
Total Residual Chlorine	N/A	N/A	N/A	N/A	N/A	0.05 mg/l	Daily	Discrete
pH	Not less than 6.0 nor greater than 9.0 standard units						Once/week	Discrete
Biomonitoring	Not less than 50% survival as required under I.A.3.						Once/month	Composite

* Both the influent and effluent shall be monitored. The arithmetic mean of the Biochemical Oxygen Demand (5 Day) and Suspended Solids values, by weight, for effluent samples collected in a period of 30 consecutive calendar days shall not exceed 15% of the arithmetic mean of the values, by weight, for influent samples collected at approximately the same times during the same period.

** N/A - Not applicable.

*** Monitoring and reporting required. No limit set at this time.

b. Species Selection

The permittee shall select a primary species for biomonitoring, as specified in paragraph a. above, from EPA 600/4-85 013, and notify EPA of the selection within 3 months of the effective date of this permit. If alternative species are developed as a result of work by the permittee, such species may be substituted for the primary species on approval by the State and EPA. Submissions for alternative species must use EPA methods. Alternative protocols must be compared to EPA protocols to demonstrate appropriateness and reliability.

c. Toxicity Reduction Evaluation

If the biomonitoring percent survival is less than 50%, the permittee must increase the biomonitoring frequency to once per week. The frequency shall remain at once per week until the permittee has achieved 50% survival in six consecutive bioassays. If the permittee has less than 50% survival in three out of any four consecutive bioassays, or if requested by the Director, the permittee shall submit, within 45 days, a plan and schedule for conducting a toxicity reduction evaluation. EPA's Toxicity Reduction Evaluation Procedures, Phases 1,2, and 3 (EPA 600/8-88-00) and TRE Protocol for POTWs (EPA 600/9-88-00) shall be the basis for this plan. Upon review of the plan by EPA, the permittee shall conduct the evaluation within the specified time frames. The toxicity reduction evaluation, when completed, shall determine the source of toxicity and how the permittee can achieve the effluent toxicity limitation of 50% survival, including an implementation schedule. Upon completion of the toxicity reduction evaluation, this permit may be modified, or alternatively revoked and reissued, in order to incorporate appropriate permit conditions and compliance schedules. The submission of a toxicity reduction evaluation plan does not waive other remedies or penalties applicable under the Clean Water Act. Failure to implement the approved toxicity reduction evaluation plan shall be considered an enforceable permit violation.

d. Biomonitoring Reopener

This permit may be reopened and modified by the permitting authority to include alternate effluent limits, additional testing and or other appropriate actions to address demonstrated effluent toxicity.

4. INDUSTRIAL WASTE LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge treated metal finishing wastes from the aircraft maintenance facilities located along taxiway no. 6, through discharge serial 003 to the base sewage collection system. Such discharges shall be monitored by the permittee once per month by grab sample at point 003 prior to discharge to the collection system, and limited as specified below. Monitoring results shall be reported monthly on the Discharge Monitoring Reports (DMRs).

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS (mg/l) Maximum for any 1 day	Monthly average shall not exceed
Cadmium (Total)	0.69	0.26
Chromium (Total)	2.77	1.71
Copper (Total)	3.38	2.07
Lead (Total)	0.69	0.43
Nickel (Total)	3.98	2.38
Silver (Total)	0.43	0.24
Zinc (Total)	2.61	1.48
Cyanide (Total)	1.20	0.65
TTO*		2.13
Oil & Grease	52	26
TSS (Total Suspended Solids)	60	31
pH	within 6.0 to 9.0	

*TTO is Total Toxic Organics as defined at 40 CFR Part 433.

5. CHLORINE REOPENER

This permit may be reopened and modified by the permitting authority to incorporate a revised chlorine limit to reflect a revision of the State Water Quality Standards. Such a revised limit would still be subject to the schedule of compliance in Part 6.a. of this permit.

6. SCHEDULE OF COMPLIANCE

a. The permittee shall construct dechlorination facilities or an alternative disinfection system as necessary to achieve compliance with the effluent limitation for total residual chlorine contained in Sections 1.a. and 2.a. of this permit. Compliance with this limitation shall be achieved in accordance with the schedule below.

1) Within three (3) months of the effective date of this permit, the permittee shall comply with interim total residual chlorine discharge limitations as stated in this section.

October 1st through May 31st the discharge of total residual chlorine shall be limited as specified below:

Daily Maximum 2.0 mg/l

June 1st through September 30th the discharge of total residual chlorine shall be limited as specified below:

Daily Maximum 3.0 mg/l

The permittee shall at all times operate the plant to achieve the lowest possible residual chlorine while still complying with other permit limitations.

2) The permittee shall achieve compliance with the final total residual chlorine limitation in Sections I.a. and 2.a. of this permit within two years of the effective date of this permit. This permit may be reopened and modified by the permitting authority to revise this schedule of compliance based on State regulations defining Best Available Demonstrated Control Technology for protection of groundwater as required by the Arizona Environmental Quality Act.

7. REPORTING AND MONITORING

a. Reporting of Monitoring Results

Monitoring results obtained during the month shall be submitted on forms to be supplied by the Regional Administrator, to the extent that the information reported may be entered on the forms. The results of all monitoring required by this permit shall be submitted in such a format as to allow direct comparison with the limitations and requirements of the permit. Unless otherwise specified, discharge flows shall be reported in terms of the average flow over each monthly period and the maximum daily flow over that monthly period. Each monthly report is due by the 28th of the following month, i.e. January report is due by February 28. Duplicate signed copies of these, and all other reports required herein, shall be submitted to the Regional Administrator and the State at the following addresses:

Water Management Division
Attention W-4
Environmental Protection Agency
215 Fremont Street
San Francisco, CA 94105

Arizona Dept. of Envir. Quality
Office of Water Quality
Water Pollution Compliance Unit
2005 North Central Avenue
Phoenix, AZ 85004

b. Twenty-Four Hour Reporting of Noncompliance

The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances to the following persons or their offices:

Mr. Steve Fuller, USEPA
(415) 974-8285

Water Pollution Compliance Unit, ADEQ
(602) 257-2333

If the permittee is unsuccessful in contacting the persons above, he shall report by 9 a.m. on the first business day following the noncompliance. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including dates and times, and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

c. Definitions

1) The "monthly or weekly average" discharge means the total discharge by weight during a calendar monthly or weekly period, respectively, divided by the number of days in the period that the facility was discharging. Where less than daily sampling is required by this permit, the monthly or weekly average discharge shall be determined by the summation of all the measured discharges by weight divided by the number of days during the monthly or weekly period when the measurements were made.

2) A "discrete" sample means any individual sample collected in less than 15 minutes. A "discrete" sample for enteric virus means any individual sample collected in less than 3 hours.

3) The "daily maximum" for mass loadings means the total discharge by weight during any calendar day.

4) The "monthly or weekly average" concentration, other than for fecal or total coliform bacteria, means the arithmetic mean of measurements made during a calendar monthly or weekly period, respectively. The "monthly or weekly average" concentration for fecal or total coliform bacteria means the geometric mean of measurements made during a monthly or weekly period, respectively. The geometric mean is the nth root of the product of n numbers.

5) The "daily maximum" *concentration* means the measurement made on any single discrete sample or 24-hour composite sample.

6) A composite sample means, for other than flow rate measurement, a combination of 8 individual portions obtained at equal time intervals for 24 hour(s) or for the duration of the discharge, whichever is shorter. The volume of each individual portion shall be directly proportional to the discharge flow rate at the time of sampling. The sampling period shall coincide with the period of maximum discharge flow.

d. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

e. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures are specified in this permit

8. SLUDGE REQUIREMENTS

a. The following information must be submitted within 60 days of the effective date of this permit.

1) A characterization of sludge quality including sludge percent solids and quantitative results of chemical analysis for the priority pollutants listed in 1987 40 CFR 122 Appendix D, Tables II and III (excluding total phenols). A list of these pollutants is included as Attachment A. All sludge samples shall be a composite of a minimum of twelve (12) discrete samples taken at equal time intervals over 24 hours. Suggested methods for analysis of sludge are provided on Attachment B. Recommended analytical holding times for sludge samples should reflect those specified in 40 CFR 136.3(e).

2) Annual sludge production in dry tons.

3) A schematic diagram showing sludge handling facilities (e.g. digesters, lagoons, drying beds, incinerators) and a solids flow diagram.

4) A narrative description of sludge dewatering and other treatment processes including process parameters. For example, if sludge is digested report average temperature and retention time of the digesters. If drying beds are used, report depth of application and drying time. If composting is used, report the temperature achieved and duration.

5) A description of disposal methods including the following information related to the disposal methods used at this facility. If more than one method is used, include the percentage of annual sludge production disposed by each method.

(i) For landfill disposal include the present classifications of the landfills used, and the names and locations of the facilities receiving sludge.

(ii) For land application include the application rate in lbs acre year (specify wet or dry), and the subsequent uses of the land.

(iii) For incineration include the disposal method of ash, and the names and locations of facilities receiving ash (if applicable).

b. Records of sludge monitoring information must meet records content requirements as stated in "Standard Federal NPDES Permit Conditions", and must also include the results of associated blank, matrix spike, replicate samples and surrogate spikes.

c. Sludge priority pollutant analysis as required by 7.b.1.(a), above shall be performed twice annually at six month intervals. The results shall be submitted within 60 days of sampling.

d. Sludge use/disposal practices must be in compliance with all current federal and state regulations. Under current EPA regulations, application of sludge to land is covered under 40 CFR 257.3-5 for Cadmium and PCB's, as described below.

1) Sludge containing concentrations of PCB's equal to or greater than 10 mg/kg (dry weight) must be incorporated into the soil when applied to land used for produing animal feed, including pasture crops for animals raised for milk. Incorporation is not required if it can be assured that the PCB content is less than 0.2 mg/kg (actual weight) in animal feed or less than 1.5 mg/kg (fat basis) in milk. Sludge containing more than 50 mg/kg PCB's must be disposed of in a hazardous waste landfill or incinerated.

2) The land application and commercially sold sludge is to be controlled so that the following application limits are not exceeded for Cd:

Soil Cation Exchange Capacity (CEC) (meq/100g)	Maximum Cumulative Application of Cd (kg/ha) Soil pH ≤ 6.5	Soil pH ≥ 6.5
> 5	5	5
5 - 15	5	10
> 15	5	20

e. Reopener. If an applicable "acceptable management practice or numerical limitation for pollutants in sewage sludge promulgated under Section 405 (d) (2) of the Clean Water Act, as amended by the Water Quality Act of 1987, is more stringent than the sludge pollutant limit or acceptable management practice in this permit, or controls a pollutant not limited in this permit, this permit may be reopened to include requirements promulgated under Section 405 (d) (2), regardless of whether or not the permit is modified. The permittee shall comply with the limitations by no later than the compliance deadline specified in the applicable regulations as required by Section 405 (d) (2) (D) of the Clean Water Act.

f. Notice of change in sludge disposal practice. The permittee shall give prior notice to the Regional Administrator of changes planned in the permittee's sludge disposal practice.

ATTACHMENT A

Priority Pollutants

Metals (1)

Antimony
Arsenic
Beryllium
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Selenium
Silver
Thallium
Zinc

Other

Cyanide
Asbestos

Pesticides

Aldrin
Dieldrin
Chlordane
4,4-DDT
4,4-DDE
4,4-DDD
Alpha-Endosulfan
Beta-Endosulfan
Endosulfan Sulfate
Endrin
Endrin Aldehyde
Heptachlor
Heptachlor Epoxide
Alpha-BHC
Beta-HC
Gamma-BHC (Lindane)
Delta-BHC
PCB 1016
PCB 1221
PCB 1232
PCB 1242
PCB 1248
PCB 1254
PCB 1260
Toxaphene

Base/Neutral Extractibles

Acenaphthene
Benzidine
1,2,4-Tichlorobenzene
Hexachlorobenzene
Hexachloroethane
Bis(2-Chloroethyl)Ether
2-Chloronaphthalene
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
3,3-Dichlorobenzidine
2,4-Dinitrotoluene
2,6-Dinitrotoluene
1,2-Diphenylhydrazine
Fluoranthene
4-Chlorophenyl Phenyl Ether
4-Bromophenyl Phenyl Ether
Bis(2-Chloroisopropyl)Ether
Bis(2-Chloroethoxy)Methane
Hexachlorobutadiene
Hexachlorocyclopentadiene
Isophorone
Naphthalene
Nitrobenzene
N-Nitrosodimethylamine
N-Nitrosodiphenylamine
N-Nitrosodi-N-Popylamine
Bis(2-Ethylhexyl)Phthalate
N-Butyl Benzyl Phthalate
Di-N-Butyl Phthalate
Di-N-Octyl Phthalate
Diethyl Phthalate
Dimethyl Phthalate
1,2-Benzanthracene
3,4-Benzo-Pyrene
3,4-Benzofluoranthene
11,12-Benzofluoranthene
Chrysene
Acenaphthylene
Anthracene
1,12-Benzoperylene
Fluorene
Phenanthrene
1,2,5,6-Dibenzanthracene
Indeno(1,2,3-CD)Pyrene
Pyrene
TCDD

Acid Extractibles

2,4,6-Trichlorophenol
P-Chloro-M-Cresol
2-Chlorophenol
2,4-Dichlorophenol
2,4-Dimethylphenol
2-Nitrophenol
4-Nitrophenol
2,4-Dinitrophenol
4,6-Dinitro-O-Cresol
Pentachlorophenol
Phenol

Volatile Organics

Acrolein
Acrylonitrile
Benzene
Carbon Tetrachloride
Chlorobenzene
1,2-Dichloroethane
1,1,1-Trichloroethane
1,1-Dichloroethane
1,1,2-Trichloroethane
1,1,2,2-Tetrachloroethane
Chloroethane
2-Chloroethyl Vinyl Ether
Chloroform
1,1-Dichloroethylene
1,2-Trans-Dichloroethylene
1,2-Dichloropropane
1,3-Dichloropropene
Ethylbenzene
Methylene Chloride
Methyl Chloride
Methyl Bromide
Bromoform
Bromodichloromethane
Dibromochloromethane
Tetrachloroethylene
Toluene
Trichloroethylene
Vinyl Chloride

Deleted

Trichlorofluoromethane
Dichlorodiflouromethane
-(46 FR 2266, 8Jan81)
Bis(Chloromethyl)Ether
-(46 FR 10724, 4Feb81)

ATTACHMENT B

Suggested methods for the analysis of sludge samples

Pesticides: EPA Method 8080 (from: Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, July, 1982, SW 846, 2nd ed.).

EPA Method 608 (from: Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, July, 1982 EPA-600/4-82-057).

Volatile Organics and Semi-Volatile Organics (BN/A's):

EPA Methods 624 and 625 (from: Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, July, 1982 EPA-600/4-82-057).

or

EPA Methods 8240 and 8270 (from: Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, July, 1982, SW 846, 2nd ed.).

Metals: Will be analyzed using methods SW-846 or the EPA 600 series for metals, as described below:

	SW-846		EPA 600 (Metals)
Element	Digestion and Analysis		Analysis
Sb	3050	7040/7041	204
As	3050	7060	206
Be	3050	7090/7091	208
Cd	3050	7130/7131	213
Cr	3050	7190/7191	218.1-3
Cu	3050	7210/7211	220
Pb	3050	7420/7421	239
Ni	3050	7520/7521	249
Se	3050	7740	270
Ag	3050	7760/7761	272
Th	3050	7840	279
Zn	3050	7950/7951	289
Hg	N/A	7470/7471	245
CN^-	N/A	9010	335

(from: Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, July, 1982, SW 846, 2nd ed.).

(from: Methods for Chemical Analysis of Water and Wastes, March, 1983, EPA 600/4-79020).

EPA Region 9 - Standard Federal NPDES Permit Conditions
(Updated as of January 29, 1988)

1) Duty to Reapply [40 CFR 122.21(d)]

The permittee shall submit a new application 180 days before the existing permit expires.

2) Applications [40 CFR 122.22]

(a) All permit applications shall be signed as follows:

(1) For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

(i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principle business function, or any other person who performs similar policy- or decision-making functions for the corporation, or

(ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes: (i) The chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA)

(b) All reports required by permits and other information requested by the Director shall be signed by a person described in paragraph (a) of this Section, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph (a) of this section;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) and,

(3) The written authorization is submitted to the Director.

(c) Changes to authorization. If an authorization under paragraph (b) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

(d) Certification. Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

3) Duty to comply [40 CFR 122.41(a)]

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification, or denial of a permit renewal application.

(1) The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

(2) The Clean Water Act provides that:

(A) Any person who causes a violation of any condition in this permit is subject to a civil penalty not to exceed $25,000 per day of each violation. Any person who negligently causes a violation of any condition in this permit is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or both for a first conviction. For a second conviction, such a person is subject to a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two years, or both. [Updated pursuant to the Water Quality Act of 1987]

(B) Any person who knowingly causes violation of any condition of this permit is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than three years, or by both for a first conviction. For a second conviction, such a person is subject to a fine of not more than $100,000 per day of violation, or by imprisonment of not more than six years, or both. [Updated pursuant to the Water Quality Act of 1987]

(C) Any person who knowingly causes a violation of any condition of this permit and, by so doing, knows at that time that he thereby places another in imminent danger of death or serious bodily injury shall be subject to a fine of not more than $250,000, or imprisonment of not more than 15 years, or both. A person who is an organization and violates this provision shall be subject to a fine of not more than $1,000,000 for a first conviction. For a second conviction under this provision, the maximum fine and imprisonment shall be doubled. [Updated pursuant to the Water Quality Act of 1987]

4) Need to halt or reduce activity not a defense [40 CFR 122.41(c)]

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

5) Duty to mitigate [40 CFR 122.41(d)]

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

6) Proper operation and maintenance [40 CFR 122.41(e)]

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

7) Permit actions [40 CFR 122.41(f)]

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

8) Property rights [40 CFR 122.41(g)]

This permit does not convey any property rights of any sort, or any exclusive privilege.

9) Duty to provide information [40 CFR 122.41(h)]

The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Director upon request, copies of records required to be kept by this permit.

10) Inspection and entry [40 CFR 122.41(i)]

The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(3) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(4) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

11) Monitoring and records [40 CFR 122.41(j)]

(1) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(2) The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

(3) Records of monitoring information shall include:

(i) The date, exact place, and time of sampling or measurements;

(ii) The individual(s) who performed the sampling or measurements;

(iii) The date(s) analyses were performed;

(iv) The individual(s) who performed the analyses;

(v) The analytical techniques or methods used; and

(vi) The results of such analyses

(4) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

(5) The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained in this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years per violation, or by both for a first conviction. For a second conviction, such a person is subject to a fine of not more than $20,000 per day of violation, or imprisonment for not more than four years, or both. [Updated pursuant to the Water Quality Act of 1987]

12) Signatory requirement [40 CFR 122.41(k)]

(1) All applications, reports, or information submitted to the Director shall be signed and certified. (See 40 CFR 122.22)

(2) The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years per violation, or

by both for a first conviction. For a second conviction, such a person is subject to a fine of not more than $20,000 per day of violation, or imprisonment of not more than four years, or both. [Updated pursuant to the Water Quality Act of 1987]

13) Reporting requirements [40 CFR 122.41(l)]

(1) Planned changes. The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

(i) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or

(ii) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).

(2) Anticipated noncompliance. The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

(3) Transfers. This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act (CWA). (See 40 CFR 122.61; in some cases, modification or revocation and reissuance is mandatory.)

(4) Monitoring reports. Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(i) Monitoring results must be reported on a Discharge Monitoring Report (DMR).

(ii) If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR Part 136 or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.

(iii) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

(5) Compliance schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

(6) Twenty-four hour reporting.

(i) The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or

planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(ii) The following shall be included as information which must be reported within 24 hours under this paragraph.

(A) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 CFR 122.41(g).)

(B) Any upset which exceeds any effluent limitation in the permit.

(C) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in the permit to be reported within 24 hours. (See 40 CFR 122.44(g).)

(iii) The Director may waive the written report on a case-by case basis for reports under paragraph (6)(ii) of this section if the oral report has been received within 24 hours

(7) Other noncompliance. The permittee shall report all instances of noncompliance not reported under paragraphs (4), (5), and (6) of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (6) of this section.

(8) Other information. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

14) Bypass [40 CFR 122.41(m)]

(1) Definitions

(i) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

(ii) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

(2) Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs (3) and (4) of this section.

(3) Notice-

(i) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, of possible at least ten days before the date of the bypass.

(ii) Unanticipated bypass. If the permittee shall submit notice of an unanticipated bypass as required in paragraph (a)(6) of section 13) (24-hour notice).

(4) Prohibition of bypass.

(i) Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:

(A) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(B) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(C) The permittee submitted notices as required under paragraph (3) of this section.

(ii) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph (4)(i) of this section.

15) Upset [40 CFR 122.41(n)]

(1) Definition.

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(2) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph (3) of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(3) Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(i) An upset occurred and that the permittee can identify the cause(s) of the upset;

(ii) The permitted facility was at the time being properly operated; and

(iii) The permittee submitted notice of the upset as required in paragraph 13)(6)(ii)(B)(24-hour notice).

(iv) The permittee complied with any remedial measures required under 40 CFR 122.41(d).

(4) Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

16) Existing manufacturing, commercial, mining, and silvicultural dischargers [40 CFR 122.42(a)]

In addition to the reporting requirements under 40 CFR 122.41(l), all existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Director as soon as they know or have reason to believe:

(1) That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(i) One hundred micrograms per liter (100 ug/l);

(ii) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

(iii) Five times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(iv) The level established by the Director in accordance with 40 CFR 122.44(f)

(2) That any activity has occurred or will occur which would result in any discharge, on a nonroutine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels"

(i) Five hundred micrograms per liter (500 ug/l);

(ii) One milligram per liter (1 mg/l) for antimony;

(iii) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7);

(iv) The level established by the Director in accordance with 40 CFR 122.44(f)

17) Publicly owned treatment works [40 CFR 122.42(b)]

This section applies only to publicly owned treatment works as defined at 40 CFR 122.2.

(1) All POTW's must provide adequate notice to the Director of the following:

(i) Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of CWA if it were directly discharging those pollutants; and

(ii) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

(iii) For purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

(2) [The following condition has been established by Region 9 to enforce applicable requirements of the Resource Conservation and Recovery Act] Publicly owned treatment works may not receive hazardous waste by truck, rail, or dedicated pipe except as provided under 40 CFR 270. Hazardous wastes are defined at 40 CFR 261 and include any mixture containing any waste listed under 40 CFR 261.31 - 261.33. The Domestic Sewage Exclusion (40 CFR 261.4) applies only to wastes mixed with domestic sewage in a sewer leading to a publicly owned treatment works and not to mixtures of hazardous wastes and sewage or septage delivered to the treatment plant by truck.

18) Reopener clause [40 CFR 122.44(c)]

This permit shall be modified or revoked and reissued to incorporate an applicable effluent standard or limitation under sections 301(b)(2)(C), and (D), 304(b)(2) and 307(a)(2) which is promulgated or approved after the permit is issued if that effluent standard or limitation is more stringent than any effluent limitation in the permit, or controls a pollutant not limited in the permit.

19) Privately owned treatment works [The following conditions were established by Region 9 to enforce applicable requirements of the Resource Conservation and Recovery Act and 40 CFR 122.44(m)]

This section applies only to privately owned treatment works as defined at 40 CFR 122.2.

(1) Materials authorized to be disposed of into the privately owned treatment works and collection system are typical domestic sewage. Unauthorized materials are hazardous waste (as defined at 40 CFR Part 261), motor oil, gasoline, paints, varnishes, solvents, pesticides, fertilizers, industrial wastes, or other materials not generally associated with toilet flushing or personal hygiene, laundry, or food preparation, unless specifically listed under "Authorized Non-domestic Sewer Dischargers" elsewhere in this permit.

(2) It is the permittee's responsibility to inform users of the privately owned treatment works and collection system of the prohibition against unauthorized materials and to ensure compliance with the prohibition. The permittee must have the authority and capability to sample all discharges to the collection system, including any from septic haulers or other unsewered dischargers, and shall take and analyze such samples for conventional, toxic, or hazardous pollutants when instructed by the permitting authority or by an EPA, State or Tribal inspector. The permittee must provide adequate security to prevent unauthorized discharges to the collection system.

(3) Should a user of the privately owned treatment works desire authorization to discharge non-domestic wastes, the permittee shall submit a request for permit modification and an application, pursuant to 40 CFR 122.44(m), describing the proposed discharge. The application shall, to the extent possible, be submitted using EPA Forms 1 and 2C, unless another format is requested by the permitting authority. If the privately owned treatment works or collection system user is different from the permittee, and the permittee agrees to allow the non-domestic discharge, the user shall submit the application and the permittee shall submit the permit modification request. The application and request for modification shall be submitted at least 6 months before authorization to discharge non-domestic wastes to the privately owned treatment works or collection system is desired.

20) Transfers by modification [40 CFR 122.61(a)]

Except as provided in section 21), a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued (under 40 CFR 122.62(b)(2)), or a minor modification made (under 40 CFR 122.63(d)), to identify the new permittee and incorporate such other requirements as may be necessary under CWA.

21) Automatic transfers [40 CFR 122.61(b)]

As an alternative to transfers under section 20), any NPDES permit may be automatically transferred to a new permittee if:

(1) The current permittee notifies the Director at least 30 days in advance of the proposed transfer date in paragraph (2) of this section;

(2) The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

(3) The Director does not notify the existing permittee and the proposed new permittee of his or her intent to modify or revoke and reissue the permit. A modification under this subparagraph may also be a minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in the paragraph (2) of this section.

22) Minor modification of permits [40 CFR 122.63]

Upon the consent of the permittee, the Director may modify a permit to make the corrections or allowances for changes in the permitted activity listed in this section, without following the procedures of 40 CFR Part 124. Any permit modification not processed as a minor modification under this section must be made for cause and with 40 CFR Part 124 draft permit and public notice as required in 40 CFR 122.62. Minor modifications may only:

(1) Correct typographical errors;

(2) Require more frequent monitoring or reporting by the permittee;

(3) Change an interim compliance date in a schedule of compliance, provided the new date is not more than 120 days after the date specified in the existing permit and does not interfere with attainment of the final compliance date requirement; or

(4) Allow for a change in ownership or operational control of a facility where the Director determines that no other change in the permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new permittees has been submitted to the Director.

(5)(i) Change the construction schedule for a discharger which is a new source. No such change shall affect a discharger's obligation prior to discharge under 40 CFR 122.29.

(ii) Delete a point source outfall when the discharge from that outfall is terminated

and does not result in discharge of pollutants from other outfalls except in accordance with the permit limits.

(6) When the permit becomes final and effective on or after March 9, 1982, conform to changes respecting 40 CFR 122.41(e), (l), (m)(4)(i)(B), (n)(3)(i), and 122.42(a) issued September 26, 1984.

(7) Incorporate conditions of a POTW pretreatment program that has been approved in accordance with the procedures in 40 CFR 403.11 as enforceable conditions of the POTW's permit.

23) Termination of permits [40 CFR 122.64]

The following are causes for terminating a permit during its term, or for denying a permit renewal application:

(1) Noncompliance by the permittee with any condition of the permit;

(2) The permittee's failure in the application or during the permit issuance process to disclose fully all relevant facts, or the permittee's misrepresentation of any relevant facts at any time;

(3) A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination; or

(4) A change in any condition that requires either a temporary or a permanent reduction or elimination of any discharge controlled by the permit (for example, plant closure or termination of discharge by connection to a POTW).

24) Availability of Reports [Pursuant to Clean Water Act,Section 308]

Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Regional Administrator. As required by the Act, permit applications, permits, and effluent data shall not be considered confidential.

25) Removed Substances [Pursuant to Clean Water Act Section 301]

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

26) Severability [Pursuant to Clean Water Act Section 512]

The provisions of this permit are severable, and if any provision of this permit, or he application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and remainder of this permit, shall not be affected thereby.

27) Civil and Criminal Liability [Pursuant to Clean Water Act Section 309]

Except as provided in permit conditions on "Bypass" (Section 14) and "Upset" (Section 15), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

28) Oil and Hazardous Substance Liability [Pursuant to Clean Water Act Section 311]

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Clean Water Act.

29) State or Tribal Law [Pursuant to Clean Water Act Section 510]

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the operator from any responsibilities, liabilities, or penalties established pursuant to any applicable State or Tribal law or regulation under authority preserved by Section 510 of the Clean Water Act.

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